Anaxagoras of Clazomenae

Fragments and *Testimonia*

A TEXT AND TRANSLATION
WITH NOTES AND ESSAYS BY
PATRICIA CURD

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To My Teachers

John M. Cooper
Alan E. Fuchs
Alexander Nehamas

CONTENTS

Acknowledgments ix

Abbreviations xiii

Introduction 3

To the Reader 9

PART 1: THE FRAGMENTS AND THEIR CONTEXTS 13

PART 2: NOTES ON THE FRAGMENTS AND TESTIMONIA 31

Notes on the Fragments 33

Testimonia 77

PART 3: ESSAYS 127

1 Anaxagoras's Life and Work 129

2 The Original Mix and the Seeds 153

3 Everything in Everything 178

4 Minding Things: The Workings of *Nous* 192

5 Anaxagorean Science 206

The Ancient Sources for Anaxagoras 235

Bibliography 245

General Index 255

Index Locorum 266

Index Nominum 274

Index of Greek Words 278

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ABBREVIATIONS

I have used the following abbreviations and short references for standard texts and reference works. Full information may be found in the Bibliography.

CAG	Berlin Academy series *Commentaria in Aristotelem Graeca* (Berlin: Reimer 1882–1909).
DG	Diels *Doxographi Graeci*.
DK	Diels and Kranz, eds *Die Fragmente der Vorsokratiker*.
In Phys.	Simplicius' *Commentary on Aristotle's Physics*, in CAG.
KRS	Kirk, Raven, and Schofield *The Presocratic Philosophers*, 2nd edition.
Lanza	Lanza *Anassagora: Testimonianze e Frammenti*.
LSJ	Liddell, Scott, and Jones, eds *A Greek-English Lexicon*.
OCD	*The Oxford Classical Dictionary*.
OCT	Oxford Classical Texts series.
Schaubach	Schaubach *Anaxagorae Clazomenii Fragmenta quae supersunt omnia*.
Schofield	Schofield *An Essay on Anaxagoras*.
Sider	Sider *The Fragments of Anaxagoras*.
TLG	*Thesaurus Linguae Graecae*, a comprehensive digital library of Greek literature, with a searchable database to be found at http://ptolemy.tlg.uci.edu/

Abbreviations for ancient works follow LSJ and OCD, although there are occasional expansions for ease of recognition. Except where noted, I have followed DK for the texts of the fragments and testimonia of the Presocratics, and the editions in the Oxford Classical Texts series for Plato and

Aristotle. Texts for the Commentators on Aristotle follow the editions of the Berlin Academy (CAG).

The usual method of referring to the Presocratics has been followed. Each philosopher is assigned a number by DK; where the reference may be unclear, I have included that number. 'A' refers to the section of testimonia, reports about a thinker, assigned to each philosopher by DK; 'B' refers to the section of fragments, direct quotations, accepted as authentic by DK. Thus, 59B12 refers to Anaxagoras (59) Fragment (B) 12. Where the reference is clearly to a particular philosopher, I have sometimes omitted the identifying DK number.

Anaxagoras of Clazomenae

INTRODUCTION

There was an illustrious man from Clazomenae, Anaxagoras the physicist ...
Strabo, *Geography* 14, A7

Anaxagoras of Clazomenae held views that, even in the context of early Greek thought, seem strange. He claimed, for instance, that everything is in everything and that 'of the small there is no smallest, but always a smaller.' He was famous for asserting that the cosmos is directed by Mind, and notorious for insisting that the moon is a stone and the sun a piece of red-hot burning iron. His account of the formation of the cosmos apparently allows for other worlds where 'there are sun and moon and the other heavenly bodies for them, just as with us.' He was reportedly the first of the early Greek philosophers to settle in Athens, he was a friend of Pericles, and the Athenians prosecuted him for impiety.

The present volume is an introduction to the philosophy of Anaxagoras. Following the pattern of the Phoenix Presocratics Series, it aims to make Anaxagoras and his ideas accessible to modern readers through translations of the ancient Greek and Latin texts and by providing explanatory notes and interpretive essays. Any account of Anaxagoras has to rely on two sorts of evidence. In ancient lists of authors and their works, Anaxagoras almost always appears with those who wrote only one book; that book (like all the works of the early Greek philosophers) is lost to us, but fragments survive as quotations in the works of others, notably Simplicius and Sextus Empiricus.[1] There has been much debate among scholars about the use-

1 Scholars dispute the extent and accuracy of the quotations; the Notes on the Fragments address the most important of these problems. More general discussions can be found in the works referred to in The Ancient Sources for Anaxagoras.

fulness of contexts for helping to determine the meaning of a fragment.[2] Here I have embedded the fragments in thier contexts. There are also accounts of Anaxagoras's life and views in other writers; these are called testimonia and are of varying reliability. The standard collection of texts is *Die Fragmente der Vorsokratiker* edited by Diels and Kranz, and it is from this that the translations of fragments and testimonia included here have been made.[3] Following the fragments, there are notes that explore textual issues and the expressions that Anaxagoras uses.[4] The notes are designed to aid in understanding what a fragment says; the essays provide a more comprehensive account of Anaxagoras's philosophical and scientific views. In the essays I offer an interpretation of the elements of Anaxagoras's theory and address the problems facing anyone who attempts a reconstruction of his views. The first essay explores what we know of Anaxagoras's life and the philosophical world in which he wrote; each of the others focuses on a crucial part of Anaxagoras's system. These essays are not neutral discussions; they are my reconstruction and interpretation of Anaxagoras, with discussions and (sometimes) criticisms of other interpretations, and references to help the reader in exploring the issues. Together with the translations and the notes, the essays try to present a coherent account of all the parts of Anaxagoras's complex and intriguing philosophical system.

Anaxagoras belonged to the group that Aristotle called the *physiologoi*, that is, those who give an account of nature (i.e., the physicists). *Physiologoi* is a fourth-century term, and it indicates what Aristotle, looking back at his sixth- and fifth-century predecessors, thought was distinctive about those to whom he applied the label. In book I of the *Metaphysics*, Aristotle says that the *physiologoi* claim that 'what-is is what is perceptible and contained by the so-called heavens' (*Met.* 989b30ff.).[5] Like the

2 Differing views may be found in the arguments advanced by Osborne, Mueller, and Mansfield (*Heresiography*).

3 Although the translations given here generally follow the DK text, in some cases there are divergences. Differences in the fragments have been noted; in the testimonia some passages have been extended and other texts added. In all cases, the identification and numbering of fragments and testimonia follow DK.

4 The notes are not intended to be a full philological commentary. David Sider's edition of the fragments is an excellent source for that.

5 This claim occurs in the midst of Aristotle's discussion of the Pythagoreans. His argument is that although they adopt non-perceptible principles and elements, the Pythagoreans agree with the natural philosophers about the subject of inquiry. At *Poetics* 1447b15ff., Aristotle contrasts Homer and Empedocles, and says that they have nothing in common except that they both wrote in verse; if the former is justly to be called a poet, the other should be called a physicist (*physiologos*). Aristotle's argument is not about the quality of the verse; rather his focus on mimesis or imitation in this

others classified by Aristotle as natural philosophers, Anaxagoras wrote on many topics, attempting, as Aristotle says, to give an account of all nature. Also like them, Anaxagoras would not have regarded his work as falling into the separate areas that we now identify as science and philosophy, physics, biology, metaphysics, and epistemology. His goal was to explain the whole cosmos: what it is made of, how it has come to be as it is, how the heavenly bodies behave and why, the nature and causes of meteorological phenomena and of earthquakes, how humans and plants develop, how perception occurs and what we can know of the world. Nevertheless, in analysing Anaxagoras's work, it is useful to distinguish its various facets. Considering the metaphysical presuppositions of his theory separately from the details of the physical theory, and analysing each part of the physical theory, will help elucidate some of the more challenging views that Anaxagoras holds. When we do this, we can see how the various parts of Anaxagoras's theories are coherent and related to each other.

Essay 1 places Anaxagoras in his historical and philosophical context. Because the details of Anaxagoras's life and his time in Athens are sketchy there is much scholarly debate about chronological details. I assess the conflicting evidence and suggest what can be plausibly accepted about Anaxagoras's life and his time in Athens. As far as Anaxagoras's place in fifth-century thought is concerned, I argue that Anaxagoras is a genuine heir of Parmenides, accepting the Eleatic strictures against becoming and passing-away, and proposing a physical theory that meets Parmenides' criteria for an acceptable theory of what-is. The first essay also considers Anaxagoras's importance for Plato and Aristotle, and the problems that Aristotle's treatment of Anaxagoras raises for our understanding of him. Aristotle is an irreplaceable source for early Greek thought, but his evidence must be treated carefully, not because Aristotle misunderstood or deliberately misrepresented his predecessors, but because he was primarily interested in developing his own philosophical views rather than in giving a dispassionate historical account.[6] A judicious assessment of Aristotle's

introductory chapter of the *Poetics* shows that Aristotle's argument is that Homer produces imitation and is thus a poet, while Empedocles attempts to give a true account of how things are in the world. At *De Generatione Animalium* 763b31 Aristotle explicitly refers to Anaxagoras as one of the natural philosophers.

6 Some, most notably Cherniss, argued that Aristotle misrepresents the Presocratics. This problem is too broad and contentious to pursue here, but the argument of essay 1 is consistent with more recent scholarship in arguing that despite certain difficulties in his account of Anaxagoras, Aristotle's evidence is, in general, more trustworthy than some earlier scholars contended.

evidence gives us the proper foundation for reconstructing Anaxagoras's thought.

Accepting Parmenides' arguments, Anaxagoras denies that genuine coming-to-be is possible, if by that we mean the generation of something from nothing, and he likewise asserts the impossibility of genuine destruction for what-is. Nevertheless, Anaxagoras allows for the apparent coming-to-be and passing-away of sensible objects through the mixing and dissociating of ingredients that are always present, that are themselves never subject to genesis and destruction, and that can be the objects of knowledge. This allows him to give a metaphysically acceptable account of the development of the cosmos, and of the processes that occur in it. Anaxagoras begins his account of the cosmos with a mixture of these ingredients, and explains the formation of the sensible world through their separation and recombination. Essay 2 focuses on the nature of these basic entities in Anaxagoras's theory, exploring his claims about their unlimited extent and number, and examining current scholarly debate. I argue for a theory that falls between the view that the original mixture contained only the opposites and the claim that the original mix contained everything now in the present world. This view shows that Anaxagoras had reasons for adopting such an intermediate ontology. It offers a coherent explanation of the physical and biological world as it is now, while allowing for theoretical restrictions on natural processes and explaining the agency of human beings in shaping the world. This account of the original state of things is complicated by two references to seeds in the fragments; this problem, too, is explored in Essay 2, and I argue that a biological interpretation of the seeds both fits the evidence and sits well with the moderate ontology that I propose. This ontology allows for a distinction between the basic entities (ingredients such as opposites, metals, seeds, flesh, blood, bone, etc.) and the sensible objects or natural artefacts (such as olive trees, dogs, human beings, etc.) that come to be and pass away through the mixture and dissociation of the basic ingredients.

In the beginning, says Anaxagoras, all things were together. All the ingredients were combined in an original mixture so complete that nothing discrete was discernible. A rotation was begun by Mind (*Nous*), and as the mixture revolved, ingredients began to separate off. Despite the continual and never-ending rotation, Anaxagoras insists that 'just as in the beginning, so too now, all things are together' (B6). This does not simply mean that the mixture is maintained; Anaxagoras asserts something stronger: In everything there is a share of everything (B11, B12). This is one of the most mysterious of Anaxagoras's views, and it is supported by the equally mysterious assertion that there is no limit to the

smallness or the largeness of any ingredient (B3 and B6). Essay 3 explores these claims, arguing that they are grounded in Anaxagoras's metaphysical commitments, and are a crucial aspect of a theory that is both respectful of Eleatic arguments about the nature of reality and that can explain apparent coming-to-be and passing-away. Understanding why Anaxagoras insists on the everything-in-everything principle as well as the principle of unlimited smallness and largeness, we can interpret these principles in ways that diminish their mystery, make them plausible, and show their importance for the integrated theory that Anaxagoras has worked out.

The indefinitely extended mixture of all things is set in motion by *Nous* (Mind), and Anaxagoras's theory of *Nous* was famous throughout the ancient world. (According to Diogenes Laertius, Anaxagoras was nicknamed '*Nous*.') Yet Anaxagoras was also ridiculed by both Plato and Aristotle for making no real use of his Mind once it had set the mass of ingredients in motion. Essay 4 examines Anaxagoras's concept of *Nous*: what *Nous* does in the system, how it rules and controls all things (including the rotation), what it knows, and why it must have that knowledge. I conclude that *Nous*, too, is a fundamental part of Anaxagoras's cosmology, and argue that Anaxagoras uses his *Nous* in ways that may have not been fully appreciated by his critics, both ancient and modern.

Most of the surviving fragments from Anaxagoras's book deal with the original mixture, the processes of separation and mixture, the formation of the cosmos through the action of *Nous*, and the nature of *Nous* itself. Yet some of the fragments and many of the testimonia attest to the extraordinary range of Anaxagoras's interests, and to his explanations of the formation of the cosmos, and of the nature and motions of the heavenly bodies (from the nature of the stars to the motions of the planets, to explanations of comets, meteors, and eclipses). He attempted to explain various weather phenomena and earthquakes, why the sea is salty and how fish breathe, the nature of plants, and problems in embryology. Perception and knowledge also interested Anaxagoras: he explored how sensation occurs and to what extent perception can provide us with knowledge. Essay 5 explores Anaxagoras's cosmological, astronomical, meteorological, biological, and epistemological views, focusing on how those views are connected with Anaxagoras's philosophical accounts of what there is. I argue that aspects of Anaxagoras's theories (that the stars are burning rocks, for instance) can be traced to his account of the formation of the cosmos through the revolving motion instigated by *Nous*, and that his account of knowledge shows that although our senses are inadequate for determining truth on their own, through the use of our own minds (the *nous* in us), we can come to a better understanding of the world we inhabit.

TO THE READER

Some words in the fragments and testimonia have or have acquired specialized meaning in Anaxagoras's theory and in scholarly discussions of that theory. Among these are the terms that Anaxagoras uses for the various processes of separation that occur in the cosmos, *Nous* (or Mind), and the homogeneous or homoiomerous stuffs mentioned repeatedly in the testimonia. Scholars have translated these terms in numerous ways; any translator and interpreter of Anaxagoras must make decisions about them. In this volume, I have opted for certain translations and have attempted to be consistent about them, occasionally at the expense of elegance or economy. Here I briefly discuss some those words and my translations. Fuller discussions can be found in the Notes on the Fragments and in the Essays.

Separation off, dissociation, joining together: Once the original mixture of ingredients has been set in motion by *Nous*, the rotation causes shifts in the ingredients. These shifts are the forces that produce the phenomena of the natural world: the objects and events that we perceive. We ourselves are part of that natural world, produced and affected by the same forces. The words that Anaxagoras uses for the shifts in the mass of ingredients are all compounds, based on forms of the verb κρίνειν, or, in the present middle/passive infinitive that Anaxagoras often uses, κρίνεσθαι (*krinō*, *krinesthai*). In its basic active form, to *krinein* is to separate, to distinguish, to judge or decide (as in Parmenides B7.5), to choose. All these actions involve discernment and the distinguishing of one thing from another or from a background. Although the terms Anaxagoras uses are always compounds of the *krinō* words, he exploits the discernment/distinguishing aspects when he uses these compounds from *krinein* to mark off the various

processes that occur because of the revolution of the mass of original stuffs. The mass is set in motion by his cosmic Mind, or *Nous*; and the implication is that while these are natural processes that follow a natural order, they are still ultimately dependent on the decision of *Nous* to set the rotation going, and they are ultimately intelligible to cosmic *Nous* and to our own limited minds. The compound verbs are ἀποκρίνεσθαι (*apokrinesthai*), διακρίνεσθαι (*diakrinesthai*), προσκρίνεσθαι (*proskinesthai*) and συγκρίνεσθαι (*sugkrinesthai*).

I translate forms of ἀποκρίνεσθαι (*apokrinesthai*) as *separating off*. This is the main process at work in Anaxagoras's universe. Although the *apo-* prefix has a spatial connotation, which may imply separation from the original mass of ingredients, it is important to keep in mind a fundamental tenet of Anaxagoras's view: the original mass extends indefinitely, everything is in everything at the beginning of the rotation, and everything remains in everything. No ingredient of the original mix can exist separately, purely, or on its own. After the original mixture begins to move, ingredients are moved about and mixed or joined together to form the temporary emergences or mixtures that we think of as the contents of the sensible world. This is what most people (incorrectly) call 'coming-to-be.' What we call 'passing-away' is the dissociation of these mixtures (*dissociation* is my translation of forms of διακρίνεσθαι [*diakrinesthai*]). This process is what constitutes the dissolution or dismemberment of a sensible object into its component ingredients: it is thus the destruction, death, or passing-away of the item. A third member of the family of *krinō* verbs, *proskinesthai* (προσκρίνεσθαι – to join together) is possibly Anaxagoras's coinage, and with its image of bringing together separated things, it is an ideal word to use for the joining together of ingredients that have previously been separated off from the mass of ingredients or which have been dissociated by the 'passing-away' of a natural artefact. Finally, there is συγκρίνεσθαι (*sugkrinesthai*), a participial form of which appears in B4a. This, like *proskinesthai*, indicates a compound of the ingredients that have begun to be separated and are then brought together by the revolutions.

Nous: Anaxagoras's great cosmic principle is *Nous*. The word can be translated as 'mind,' 'rational principle,' or even (perhaps) 'rational faculty.' Because *Nous* plays so many roles in Anaxagoras, I generally leave it untranslated, allowing the context and discussion help to indicate what sense is at play in a particular occurrence. (The exception is in the translations of the testimonia, where I usually employ the translated form 'mind.') When the context indicates that *Nous* is Anaxagoras's great cosmic mind or rational principle, I capitalize. When the discussion involves what An-

axagoras calls 'the smaller' mind (such as mind in human beings or in other entities), I use lower case.

Homogeneous stuffs: These are Aristotle's 'like-parted' (homoiomerous) things. Aristotle attributes a view about these to Anaxagoras, and the Aristotelian commentators follow him in using this language in discussing Anaxagoras. This has led to some interpretative difficulties, which I discuss in Essay 1.

PART ONE

The Fragments and Their Contexts

B1 Simplicius *in Phys.* 155.23

ὅτι δὲ Ἀναξαγόρας ἐξ ἑνὸς μίγματος ἄπειρα τῷ πλήθει ὁμοιομερῆ ἀποκρίνεσθαί φησιν πάντων μὲν ἐν παντὶ ἐνόντων, ἑκάστου δὲ κατὰ τὸ ἐπικρατοῦν χαρακτηριζόμενου, δηλοῖ διὰ τοῦ πρώτου τῶν Φισικῶν λέγων ἀπ᾽ ἀρχῆς· ὁμοῦ χρήματα πάντα ἦν,[1] ἄπειρα καὶ πλῆθος καὶ σμικρότητα· καὶ γὰρ τὸ σμικρὸν ἄπειρον ἦν. καὶ πάντων ὁμοῦ ἐόντων οὐδὲν ἔνδηλον ἦν ὑπὸ σμικρότητος· πάντα γὰρ ἀήρ τε καὶ αἰθὴρ κατεῖχεν, ἀμφότερα ἄπειρα ἐόντα· ταῦτα γὰρ μέγιστα ἔνεστιν ἐν τοῖς σύμπασι καὶ πλήθει καὶ μεγέθει.

B2 Simplicius *in Phys.* 155.30

καὶ μετ᾽ ὀλίγον· καὶ γὰρ ἀήρ τε καὶ αἰθὴρ ἀποκρίνονται ἀπὸ τοῦ πολλοῦ τοῦ περιέχοντος, καὶ τό γε περιέχον ἄπειρόν ἐστι τὸ πλῆθος.

B3 Simplicius *in Phys.* 164.14–22

καὶ γὰρ ὅτι ἄπειρα ἦν, εὐθὺς ἀρχόμενος λέγει ‘ὁμοῦ πάντα χρήματα ἦν ἄπειρα καὶ πλῆθος καὶ σμικρότητα·’ καὶ ὅτι οὔτε τὸ ἐλάχιστόν ἐστιν ἐν ταῖς ἀρχαῖς οὔτε τὸ μέγιστον, οὔτε γὰρ τοῦ σμικροῦ ἐστι τό γε ἐλάχιστον, ἀλλ᾽ ἔλασσον ἀεί (τὸ γὰρ ἐὸν οὐκ ἔστι τὸ μὴ οὐκ εἶναι)[2] – ἀλλὰ καὶ τοῦ μεγάλου ἀεί ἐστι μεῖζον. καὶ ἴσον ἐστὶ τῷ σμικρῷ πλῆθος, πρὸς ἑαυτὸ δὲ ἕκαστόν ἐστι καὶ μέγα καὶ σμικρόν. *εἰ γὰρ πᾶν ἐν παντὶ καὶ πᾶν ἐκ παντὸς ἐκκρίνεται, καὶ ἀπὸ τοῦ ἐλαχίστου δοκοῦντος ἐκκριθήσεταί τι ἔλασσον ἐκείνου, καὶ τὸ μέγιστον δοκοῦν ἀπό τινος ἐξεκρίθη ἑαυτοῦ μείζονος.*

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1 On the text, see the Notes on the Fragments in part 2.
2 For a discussion of the text here, see the Notes.

B1

Anaxagoras says that the homogeneous stuffs, unlimited in amount, are separated off from a single mixture, with all things being in everything but each being characterized by what predominates. He makes this clear in the first book of the *Physics*, when he says at the beginning, 'All things were together, unlimited both in amount and in smallness, for the small, too, was unlimited. And because all things were together, nothing was evident on account of smallness; for air and aether covered all things, both being unlimited, for these are the greatest among all things both in amount and in largeness.'

B2

And a little later: 'for both air and aether are separated off from the surrounding mass, and what is surrounding is unlimited in extent.'

B3

For in fact Anaxagoras says directly at the beginning of the book that [the ingredients] were unlimited: 'all things were together, unlimited both in amount and in smallness' [B1], and that there is neither a smallest nor a largest among the first principles: 'Nor of the small is there a smallest, but always a smaller (for what-is cannot not be) – but also of the large there is always a larger. And [the large] is equal to the small in extent (*plēthos*), but in relation to itself each thing is both large and small.' For if everything is in everything and if everything is separated off from everything, then from what seems to be the smallest something yet smaller than that will be separated off, and what seems to be the largest was separated off from something larger than itself.

B4a Simplicius *in Phys.* 34.18–20, 27

Ἀναξαγόρας δὲ ὁ Κλαζομένιος ἔοικε τῶν εἰδῶν πάντων τριττὴν θεάσασθαι τὴν διαφοράν, τὴν μὲν κατὰ τὴν νοητὴν ἕνωσιν συνῃρημένην, ὅταν λέγῃ [B1.1 and B4b] . . .· τὴν δέ τινα ἐθεάσατο κατὰ τὴν νοερὰν διάκρισιν διακεκριμένην, πρὸς ἣν ἡ ἐνταῦθα ἀφωμοίωται. λέγει γὰρ μετ᾽ ὀλίγα τῆς ἀρχῆς τοῦ πρώτου Περὶ φύσεως Ἀναξαγόρας οὕτως· τούτων δὲ οὕτως ἐχόντων χρὴ δοκεῖν ἐνεῖναι πολλά τε καὶ παντοῖα ἐν πᾶσι τοῖς συγκρινομένοις καί σπέρματα πάντων χρημάτων καὶ ἰδέας παντοίας ἔχοντα καὶ χροιὰς καὶ ἡδονάς. καὶ ἀνθρώπους τε συμπαγῆναι καὶ τὰ ἄλλα ζῷα ὅσα ψυχὴν ἔχει. καὶ τοῖς γε ἀνθρώποισιν εἶναι καὶ πόλεις συνημμένας[3] καὶ ἔργα κατεσκευασμένα, ὥσπερ παρ᾽ ἡμῖν, καὶ ἠέλιόν τε αὐτοῖσιν εἶναι καὶ σελήνην καὶ τὰ ἄλλα, ὥσπερ παρ᾽ ἡμῖν, καὶ τὴν γῆν αὐτοῖσι φύειν πολλά τε καὶ παντοῖα, ὧν ἐκεῖνοι τὰ ὀνῆστα συνενεγκάμενοι εἰς τὴν οἴκησιν χρῶνται. ταῦτα μὲν οὖν μοι λέλεκται περὶ τῆς ἀποκρίσιος, ὅτι οὐκ ἂν παρ᾽ ἡμῖν μόνον ἀποκριθείη, ἀλλὰ καὶ ἄλλῃ. καὶ δόξει μὲν ἴσως τισὶν οὐ πρὸς νοερὰν διάκρισιν τὴν ἐν τῇ γένεσει παραβάλλειν, ἀλλὰ πρὸς τόπους ἄλλους τῆς γῆς τὴν παρ᾽ ἡμῖν συγκρίνειν οἴκησιν. οὐκ ἂν δὲ εἶπε περὶ τόπων ἄλλων καὶ ἠέλιόν τε αὐτοῖσιν εἶναι καὶ σελήνην καὶ τὰ ἄλλα, ὥσπερ παρ᾽ ἡμῖν καὶ σπέρματα πάντων χρημάτων καὶ ἰδέας ἐκάλεσε τὰ ἐκεῖ.

In Phys. 157.17

[After quoting B4a beginning at 'there are many and different' and leaving out the last sentence 'I have said this about the separation . . .,' Simplicius says]: καὶ ὅτι μὲν ἑτέραν τινὰ διακόσμησιν παρὰ τὴν παρ᾽ ἡμῖν αἰνίττεται, δηλοῖ τὸ ὥσπερ παρ᾽ ἡμῖν οὐχ ἅπαξ μόνον εἰρημένον. ὅτι δὲ οὐδὲ αἰσθητὴν μὲν ἐκείνην οἴεται, τῷ χρόνῳ δὲ ταύτης προηγησαμένην, δηλοῖ τὸ ὧν ἐκεῖνοι τὰ ὀνῆστα συνενεγκάμενοι εἰς τὴν οἴκησιν χρῶνται. οὐ γὰρ ἐχρῶντο εἶπεν, ἀλλὰ χρῶνται. ἀλλ᾽ οὐδὲ ὡς νῦν κατ᾽ ἄλλας τινὰς οἰκήσεις ὁμοίας οὔσης καταστάσεως τῇ παρ᾽ ἡμῖν. οὐ γὰρ εἶπε τὸν ἥλιον καὶ τὴν σελήνην εἶναι καὶ παρ᾽ ἐκείνοις ὥσπερ καὶ παρ᾽ ἡμῖν, ἀλλ᾽ ἥλιον καὶ σελήνην, ὥσπερ καὶ παρ᾽ ἡμῖν, ὡς δὴ περὶ ἄλλων λέγων. ἀλλὰ ταῦτα μὲν εἴτε οὕτως εἴτε ἄλλως ἔχει, ζητεῖν ἄξιον.

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3 DK's text reads *συνῳκημένας* ('have been settled'). Here I follow Sider in reading *συνημμένας*, which appears in one of the quotations of the passage in Simplicius (*in Phys.* 157.12). Sider reviews the philological support on pp. 98–99, and suggests on p. 99 that 'the notion of constructed cities is more appropriate to this fragment than inhabited cities.' In any case, even if we accept the DK text, it would still be best to understand the claim that humans have inhabited cities as asserting that they have built and live in cities. Sider's view here is accepted by Schofield (see his review of Sider and 'Revisited'). For discussion, see Essay 5.

B4a

Anaxagoras of Clazomenae seems to have regarded all the forms in three different ways. In the first, they are collected together in an intelligible unity, as when he says [B1.1 and B4b] . . . ; then, he regarded them as separated through an intellectual separation to which the separation here has been made similar. For, shortly after the beginning of the first book of his *Physics*, Anaxagoras says this, 'Since these things are so, it is right to think that there are many different things present in everything that is being combined, and seeds of all things, having all sorts of forms, colours, and flavours, and that humans and also the other animals were compounded, as many as have soul. Also that there are cities that have been constructed by humans and works made, just as with us, and that there are a sun and a moon and other heavenly bodies for them, just as with us, and the earth grows many different things for them, the most valuable of which they gather together into their household and use. I have said this about the separation off, because there would be separation off not only for us but also elsewhere.' And perhaps it will seem to some that he is not comparing the separation that occurs in the generation [of the cosmos] with an intellectual separation, but comparing the region we inhabit with other places on the earth. But he would not have said of other places [on the earth], 'and there are a sun and a moon and the others [the heavenly bodies] for them just as with us' and called the things in the intelligible region 'seeds of all things and forms.'

And the phrase 'just as for us' (which is said not merely once) makes clear that he is hinting at some other world-order in addition to ours. That he does not suppose it to be perceptible and to precede ours in time is clear from the phrase 'the most valuable of which they gathered into their household and use.' For he did not say 'used' but 'use.' Nor does he even mean that now there are households in some other regions [on the earth] that are similar to our own circumstances. For he did not say 'there are the sun and the moon for them just as also with us,' but 'a sun and a moon just as also with us,' as though speaking of some others. But it is worth inquiring whether these things are this way or some other.

B4b Simplicius *in Phys.* 34.20–27[4]

καὶ πάλιν φησί, πρὶν δὲ ἀποκριθῆναι [ταῦτα][5] πάντων ὁμοῦ ἐόντων οὐδὲ χροιὴ ἔνδηλος ἦν οὐδεμία· ἀπεκώλυε γὰρ ἡ σύμμιξις πάντων χρημάτων, τοῦ τε διεροῦ καὶ τοῦ ξηροῦ καὶ τοῦ θερμοῦ καὶ τοῦ ψυχροῦ καὶ τοῦ λαμπροῦ καὶ τοῦ ζοφεροῦ, καὶ γῆς πολλῆς ἐνεούσης καὶ σπερμάτων ἀπείρων πλῆθος οὐδὲν ἐοικότων ἀλλήλοις. οὐδὲ γὰρ τῶν ἄλλων οὐδὲν ἔοικε τὸ ἕτερον τῷ ἑτέρῳ. τούτων δὲ οὕτως ἐχόντων ἐν τῷ σύμπαντι χρὴ δοκεῖν ἐνεῖναι πάντα χρήματα. καὶ εἴη ἂν τὸ σύμπαν τοῦτο <τὸ> τοῦ Παρμένιδου ἓν ὄν.

B5 Simplicius *in Phys.* 156.9

ὅτι δὲ οὐδὲ γίνεται οὐδὲ φθείρεταί τι τῶν ὁμοιομερῶν, ἀλλ᾽ ἀεὶ τὰ αὐτά ἐστι, δηλοῖ λέγων· τούτων δὲ οὕτω διακεκριμένων γινώσκειν χρή, ὅτι πάντα οὐδὲν ἐλάσσω ἐστὶν οὐδὲ πλείω (οὐ γὰρ ἀνυστὸν πάντων πλείω εἶναι), ἀλλὰ πάντα ἴσα ἀεί. ταῦτα μὲν οὖν περὶ τοῦ μίγματος καὶ τῶν ὁμοιομερειῶν.

B6 Simplicius *in Phys.* 164.25 [after B4]

καὶ ἀλλαχοῦ δὲ ὅυτως φησί· καὶ ὅτε δὲ ἴσαι μοῖραί εἰσι τοῦ τε μεγάλου καὶ τοῦ σμικροῦ πλῆθος, καὶ οὕτως ἂν εἴη ἐν παντὶ πάντα· οὐδὲ χωρὶς ἔστιν εἶναι, ἀλλὰ πάντα παντὸς μοῖραν μετέχει. ὅτε τοὐλάχιστον μὴ ἔστιν εἶναι, οὐκ ἂν δύναιτο χωρισθῆναι, οὐδ᾽ ἂν ἐφ᾽ ἑαυτοῦ γενέσθαι, ἀλλ᾽ ὅπωσπερ ἀρχὴν εἶναι καὶ νῦν πάντα ὁμοῦ. ἐν πᾶσι δὲ πολλὰ ἔνεστι καὶ τῶν ἀποκρινομένων ἴσα πλῆθος ἐν τοῖς μείζοσί τε καὶ ἐλάσσοσι.

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4 This is the text as given by Diels in DK. The quotation of B4b at *in Phys.* 34.20ff. omits οὐδὲ γὰρ τῶν ἄλλων οὐδὲν ἔοικε τὸ ἕτερον τῷ ἑτέρῳ, which I have included here; but at *in Phys.* 156.4–9, Simplicius quotes all of B4b (except the last sentence) without pause. The last sentence of B4b as reconstructed by Diels is part of the quotation at *in Phys.* 34.25–26.

5 Sider argues that ταῦτα (omitted at *in Phys.* 156.4) was probably added at 34.21 by Simplicius. See the Notes.

B4b

And again, he says, 'Before there was separation off, because all things were together, there was not even any colour evident; for the mixture of all things prevented it, of the wet and the dry and of the hot and the cold and of the bright and the dark, and there was much earth present and seeds unlimited in number,[6] in no way similar to one another. For no one of the others is similar to another. Since these things are so, it is right to think that all things were present in the whole.' And this whole would be the one being of Parmenides.

B5

He makes clear that none of the homogeneous stuffs either comes to be or passes away, but that they are always the same, by saying: 'Even though these things have been dissociated in this way, it is right to recognize that all things are in no way less or more (for it is impossible that they be more than all), but all things are always equal.' He says these things, then, about the mixture and the homogeneous stuffs.

B6

Elsewhere, too, he also says this: 'Since the shares of the large and the small are equal in number, in this way too, all things will be in everything; nor is it possible that [anything] be separate, but all things have a share of everything. Since it is not possible that there is a least, it would not be possible that [anything] be separated, nor come to be by itself, but just as in the beginning, now too all things are together. In all things there are many things present, equal in number, both in the greater and in the lesser of the things being separated off.'

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6 The clause 'and there was much earth present . . . ' is notoriously difficult. See the Notes.

B7 Simplicius *de Caelo* 608.23

μήποτε δὲ τὸ ἄπειρον ὡς ἡμῖν ἀπερίληπτον καὶ ἄγνωστον λέγει· τοῦτο γὰρ ἐνδείκνυται διὰ τοῦ ὥστε τῶν ἀποκρινομένων μὴ εἰδέναι τὸ πλῆθος μήτε λόγῳ μήτε ἔργῳ, ἐπεὶ ὅτι τῷ εἴδει πεπερασμένα ᾤετο, δηλοῖ λέγων πάντα γιγνώσκειν τὸν νοῦν· καίτοι, εἰ ἄπειρα ὄντως ἦν, παντελῶς ἦν ἄγνωστα· ἡ γὰρ γνῶσις ὁρίζει καὶ περατοῖ τὸ γνωσθέν.

B8 Simplicius *in Phys.* 175.11[7]

εἰπόντος τοῦ Ἀναξαγόρου οὐδὲ διακρίνεται οὐδὲ ἀποκρίνεται ἕτερον ἀπὸ τοῦ ἑτέρου *διὰ τὸ πάντα ἐν πᾶσιν εἶναι, καὶ ἀλλαχοῦ* οὐ κεχώρισται ἀλλήλων τὰ ἐν τῷ ἑνὶ κόσμῳ οὐδὲ ἀποκέκοπται πελέκει οὔτε τὸ θερμὸν ἀπὸ τοῦ ψυχροῦ οὔτε τὸ ψυχρὸν ἀπὸ τοῦ θερμοῦ (*οὐ γὰρ εἶναί τι εἰλικρινὲς καθ' αὑτό*), *τοῦτο, φησίν, οὐκ εἰδότως μὲν λέγεται· οὐ γὰρ διὰ τὸ πάντα ἐν πᾶσιν εἶναι συμβαίνει τὸ μὴ διακρίνεσθαι* ...

B9 Simplicius *in Phys.* 35.15

ἄκουσον δὲ οἷα καὶ μετ' ὀλίγον φησὶ τὴν ἀμφοῖν ποιούμενος σύγκρισιν· οὕτω τούτων περιχωρούντων τε καὶ ἀποκρινομένων ὑπὸ βίης τε καὶ ταχυτῆτος (βίην δὲ ἡ ταχυτὴς ποιεῖ), ἡ δὲ ταχυτὴς αὐτῶν οὐδενὶ ἔοικε χρήματι τὴν ταχυτῆτα τῶν νῦν ἐόντων χρημάτων ἐν ἀνθρώποις, ἀλλὰ πάντως πολλαπλασίως ταχύ ἐστι.

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7 Also quoted with little introduction at *in Phys* 176.28.

B7

Perhaps by unlimited he means what is incomprehensible and unknowable to us. For this is shown by the statement, 'so as not to know the extent of the things being separated off, either in word or in deed.' For he makes it clear that he thought that they were limited in form when he says that *Nous* knows them all. And indeed if they really were unlimited, they would be altogether unknowable; for knowledge defines and limits the thing that is known.

B8

When Anaxagoras says 'nothing is dissociated or separated off one from another' [B12] because all things are in all things, and elsewhere: 'The things in the one *kosmos* have not been separated from one another, nor hacked apart with an axe – neither the hot from the cold nor the cold from the hot' (for there is not anything pure by itself), this, Aristotle says, is stated without Anaxagoras's full knowledge of what it means; for it is not because everything is in everything that the dissociation does not occur.

B9

Read[8] also what he says a little later when a comparison is made between the two: '. . . as these things are revolving in this way and being separated off by force and swiftness (the swiftness produces force), and their swiftness resembles the swiftness of nothing that is now present among humans, but is altogether many times as fast.'

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8 Here I translate *akouson* as 'read,' rather than 'listen to.' For discussion of this locution in the context of commentaries, see Schenkeveld.

B10 Scholium on Gregory of Nazianzus *Patrologia Graeca* 36 911 Migne

ὁ δὲ Ἀναξαγόρας παλαιὸν εὑρὼν δόγμα ὅτι οὐδὲν ἐκ τοῦ μηδαμῇ <μηδαμῶς ὄντος> γίνεται, γένεσιν μὲν ἀνῄρει, διάκρισιν δὲ εἰσῆγεν ἀντὶ γενέσεως. ἐλήρει γὰρ ἀλλήλοις μὲν μεμῖχθαι πάντα, διακρίνεσθαι δὲ αὐξανόμενα. καὶ γὰρ ἐν τῇ αὐτῇ γονῇ καὶ τρίχας εἶναι καὶ ὄνυχας καὶ φλέβας καὶ ἀρτηρίας καὶ νεῦρα καὶ ὀστᾶ καὶ τυγχάνειν μὲν ἀφανῆ διὰ μικρομέρειαν, αὐξανόμενα δὲ κατὰ μικρὸν διακρίνεσθαι. πῶς γὰρ ἄν, φησίν, ἐκ μὴ τριχὸς γένοιτο θρὶξ καὶ σάρξ ἐκ μὴ σαρκός; οὐ μόνον δὲ τῶν σωμάτων ἀλλά καὶ τῶν χρωμάτων ταῦτα κατηγόρει. καὶ γάρ ἐνεῖναι τῷ λευκῷ τὸ μέλαν καὶ τὸ λευκὸν τῷ μέλανι. τὸ αὐτὸ δὲ ἐπὶ τῶν ῥοπῶν ἐτίθει, τῷ βαρεῖ τὸ κοῦφον σύμμικτον εἶναι δοχάζων καὶ τοῦτο αὖθις ἐκείνῳ. (Cf. Simplicius *In Phys.* 460.16)

B11 Simplicius *in Phys.* 164.22

λέγει δὲ σαφῶς, ὅτι ἐν παντὶ παντὸς μοῖρα ἔνεστι πλὴν νοῦ, ἔστιν οἷσι δὲ καὶ νοῦς ἔνι.

B12 Simplicius *in Phys.* 164.24; 156.13

164.24: λέγει δὲ σαφῶς, ὅτι ἐν παντὶ παντὸς μοῖρα ἔνεστι πλὴν νοῦ, ἔστιν οἷσι δὲ καὶ νοῦς ἔνι. καὶ πάλιν ὅτι (beginning with τὰ μὲν ἄλλα and ending καὶ μέμεικται οὐδενί).

156.13: περὶ δὲ τοῦ νοῦ τάδε γέγραφε· τὰ μὲν ἄλλα παντὸς μοῖραν μετέχει, νοῦς δέ ἐστιν ἄπειρον καὶ αὐτοκρατὲς καὶ μέμεικται οὐδενὶ χρήματι, ἀλλὰ μόνος αὐτὸς ἐφ' ἑαυτοῦ ἐστιν. εἰ μὴ γὰρ ἐφ' ἑαυτοῦ ἦν, ἀλλά τεῳ ἐμέμεικτο ἄλλῳ, μετεῖχεν ἂν ἁπάντων χρημάτων, εἰ ἐμέμεικτό τεῳ (ἐν παντὶ γὰρ παντὸς μοῖρα ἔνεστιν, ὥσπερ ἐν τοῖς πρόσθεν μοι λέλεκται)· καὶ ἂν ἐκώλυεν αὐτὸν τὰ συμμεμειγμένα, ὥστε μηδενὸς χρήματος κρατεῖν ὁμοίως ὡς καὶ μόνον ἐόντα ἐφ' ἑαυτοῦ. ἔστι γὰρ λεπτότατόν τε πάντων χρημάτων καὶ καθαρώτατον, καὶ γνώμην γε περὶ παντὸς πᾶσαν ἴσχει καὶ ἰσχύει μέγιστον. καὶ ὅσα γε ψυχὴν ἔχει καὶ τὰ μείζω καὶ τὰ ἐλάσσω, πάντων νοῦς κρατεῖ. καὶ τῆς περιχωρήσιος τῆς συμπάσης νοῦς ἐκράτησεν, ὥστε περιχωρῆσαι τὴν ἀρχήν. καὶ πρῶτον ἀπό του σμικροῦ ἤρξατο περιχωρεῖν, ἐπὶ δὲ πλέον περιχωρεῖ, καὶ περι–χωρήσει ἐπὶ πλέον. καὶ τὰ συμμισγόμενά τε καὶ ἀποκρινόμενα καὶ

B10

When Anaxagoras discovered the old belief that nothing comes from that which is not in any way whatsoever, he did away with coming-to-be, and introduced dissociation in place of coming-to-be. For he foolishly said that all things are mixed with each other, but that as they grow they are dissociated. For in the same seminal fluid there are hair, nails, veins and arteries, sinew, and bone, and it happens that they are imperceptible because of the smallness of the parts, but when they grow, they gradually are separated off. 'For how,' he says, 'can hair come from what is not hair, and flesh from what is not flesh?' He maintained this, not only about bodies, but also about colours. For he said that black is in white and white in black. And he laid down the same thing with respect to weights, believing that light is mixed with heavy and vice versa.

B11

And he says clearly, that 'in everything there is a share of everything except *Nous*, but there are some things in which *Nous*, too, is present.'

B12

And he says clearly, that 'in everything there is a share of everything except Nous, but there are some things in which Nous, too, is present' [B11]. And again that ...

He has written the following about Nous: 'The other things have a share of everything, but *Nous* is unlimited and self-ruling and has been mixed with no thing, but is alone itself by itself. For if it were not by itself, but had been mixed with anything else, then it would partake of all things, if it had been mixed with anything (for there is a share of everything in everything just as I have said before); and the things mixed together with it would thwart it, so that it would control none of the things in the way that it in fact does, being alone by itself. For it is the finest of all things and the purest, and indeed it maintains all discernment (*gnōmē*) about everything and has the greatest strength. And *Nous* has control over all things that have soul, both the larger and the smaller. And *Nous* controlled the whole revolution, so that it started to revolve in the beginning. First it began to revolve from a small region, but it is revolving yet more, and it will revolve still more. And *Nous* knew (*egnō*) them all: the things that are being mixed together, the things that are being separated off, and the things

διακρινόμενα πάντα ἔγνω νοῦς. καὶ ὁποῖα ἔμελλεν ἔσεσθαι καὶ ὁποῖα ἦν ἄσσα νῦν μή ἐστι, καὶ ὅσα νῦν ἐστι καὶ ὁποῖα ἔσται,[9] πάντα διεκόσμησε νοῦς, καὶ τὴν περιχώρησιν ταύτην, ἥν νῦν περιχωρέει τά τε ἄστρα καὶ ὁ ἥλιος καὶ ἡ σελήνη καὶ ὁ ἀὴρ καὶ ὁ αἰθὴρ οἱ ἀποκρινόμενοι. ἡ δὲ περιχώρησις αὐτὴ ἐποίησεν ἀποκρίνεσθαι. καὶ ἀποκρίνεται ἀπό τε τοῦ ἀραιοῦ τὸ πυκνὸν καὶ ἀπὸ τοῦ ψυχροῦ τὸ θερμὸν καὶ ἀπὸ τοῦ ζοφεροῦ τὸ λαμπρὸν καὶ ἀπὸ τοῦ διεροῦ τὸ ξηρόν. μοῖραι δὲ πολλαὶ πολλῶν εἰσι. παντάπασι δὲ οὐδὲν ἀποκρίνεται οὐδὲ διακρίνεται ἕτερον ἀπὸ τοῦ ἑτέρου πλὴν νοῦ. νοῦς δὲ πᾶς ὅμοιός ἐστι καὶ ὁ μείζων καὶ ὁ ἐλάττων. ἕτερον δὲ οὐδέν ἐστιν ὅμοιον οὐδενί, ἀλλ᾽ ὅτων πλεῖστα ἔνι, ταῦτα ἐνδηλότατα ἓν ἕκαστόν ἐστι καὶ ἦν.

B13 Simplicius *in Phys.* 300.27

Ἀναξαγόρου δέ, φησὶν Ἀλέξανδρος, οὐκ ἐμνημόνευσε [Aristotle *Phys.* B2.194a15ff.] καίτοι τὸν νοῦν ἐν ταῖς ἀρχαῖς τιθέντος, ἴσως, φησίν, ὅτι μὴ προσχρῆται αὐτῷ ἐν τῇ γενέσει. ἀλλ᾽ ὅτι μὲν προσχρῆται, δῆλον, εἴπερ τὴν γένεσιν οὐδὲν ἄλλο ἢ ἔκκρισιν εἶναί φησι, τὴν δὲ ἔκκρισιν ὑπὸ τῆς κινήσεως γίνεσθαι, τῆς δὲ κινήσεως αἴτιον εἶναι τὸν νοῦν. λέγει γὰρ οὕτως Ἀναξαγόρας· καὶ ἐπεὶ ἤρξατο ὁ νοῦς κινεῖν, ἀπὸ τοῦ κινουμένου παντὸς ἀπεκρίνετο, καὶ ὅσον ἐκίνησεν ὁ νοῦς, πᾶν τοῦτο διεκρίθη· κινουμένων δὲ καὶ διακρινομένων ἡ περιχώρησις πολλῷ μᾶλλον ἐποίει διακρίνεσθαι.

B14 Simplicius *in Phys.* 157.5

ὅτι δὲ διττήν τινα διακόσμησιν ὑποτίθεται, τὴν μὲν νοεράν, τὴν δὲ αἰσθητὴν ἀπ᾽ ἐκείνης <γεγονυῖαν>, δῆλον μὲν καὶ ἐκ τῶν εἰρημένων [B12], δῆλον δὲ καὶ ἐκ τῶνδε· ὁ δὲ νοῦς, ὃς ἀεί ἐστι, τὸ κάρτα καὶ νῦν ἐστιν ἵνα καὶ τὰ ἄλλα πάντα, ἐν τῷ πολλῷ περιέχοντι καὶ ἐν τοῖς προσκριθεῖσι καὶ ἐν τοῖς ἀποκεκριμένοις.[10]

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9 The text from the beginning of the sentence to this point is uncertain. I follow DK; see also Schofield p. 3 with note and Sider. Sider changes the *ὅσα* to *ὁποῖα* (so that the clause reads *whatever things are now* rather than *as many as are now*), arguing that '[m]ost likely, *ὁποῖα νῦν ἐστι*, part of Anaxagoras' original text, was lost through haplography in Simplicius' copy' (138). Sider's change makes for desirable uniformity, but is not forced on us.

10 For the textual problems here, see the Notes.

that are being dissociated. And whatever sorts of things were going to be, and whatever sorts were and now are not, and as many as are now and whatever sorts will be, all these *Nous* set in order. And *Nous* also ordered this revolution, in which the things being separated off now revolve, the stars and the sun and the moon and the air and the aether. This revolution caused them to separate off. The dense is being separated off from the rare, and the warm from the cold, and the bright from the dark, and the dry from the moist. But there are many shares of many things; nothing is completely separated off or dissociated one from the other except *Nous*. All *Nous* is alike, both the greater and the smaller. Nothing else is like anything else, but each one is and was most manifestly those things of which there are the most in it.'

B13

Alexander says that Aristotle did not mention Anaxagoras, even though Anaxagoras set *Nous* among the first principles; perhaps, Alexander says, because Anaxagoras makes no use of it in coming-to-be. But it is clear that he does use it, because he says that coming-to-be is nothing other than separation, that separation comes to be on account of motion, and that *Nous* is the cause of motion. For Anaxagoras says this: 'When *Nous* began to move [things], there was separation off from the multitude that was being moved, and whatever *Nous* moved, all this was dissociated; and as things were being moved and dissociated, the revolution made them dissociate much more.'

B14

That he assumes a double world ordering, the first intelligible, the other perceptible, having come from the first, is clear from what has been said, and it is also clear from the following: '*Nous*, which always is, most assuredly is even now where all the other things also are, in the surrounding multitude, and in the things that were joined together and in the things that have been separated off.'

B15 Simplicius *in Phys.* 179.3

καὶ μετ᾽ ὀλίγα δέ· τὸ μὲν πυκνὸν καὶ διερὸν καὶ ψυχρὸν καὶ τὸ ζοφερὸν ἐνθάδε συνεχώρησεν, ἔνθα νῦν <ἡ>[11] γῆ, τὸ δὲ ἀραιὸν καὶ τὸ θερμὸν καὶ τὸ ξηρὸν <καὶ τὸ λαμπρὸν>[12] ἐξεχώρησεν εἰς τὸ πρόσω τοῦ αἰθέρος.

B16 Simplicius *in Phys.* 179.6; cf. 155.21

καὶ τὰ μὲν ἀρχοειδῆ ταῦτα καὶ ἁπλούστατα ἀποκρίνεσθαι λέγει, ἄλλα δὲ τούτων συνθετώτερα ποτὲ μὲν συμπήγνυσθαι λέγει ὡς σύνθετα, ποτὲ δὲ ἀποκρίνεσθαι ὡς τὴν γῆν. ὕτως γάρ φησιν· ἀπὸ τουτέων ἀποκρινομένων συμπήγνυται γῆ· ἐκ μὲν γὰρ τῶν νεφελῶν ὕδωρ ἀποκρίνεται, ἐκ δὲ τοῦ ὕδατος γῆ, ἐκ δὲ τῆς γῆς λίθοι συμπήγνυνται ὑπὸ τοῦ ψυχροῦ, οὗτοι δὲ ἐκχωρέουσι μᾶλλον τοῦ ὕδατος.

B17 Simplicius *in Phys.* 163.18

σαφῶς δὲ Ἀναξαγόρας ἐν τῷ πρώτῳ τῶν Φυσικῶν τὸ γίνεσθαι καὶ ἀπόλλυσθαι συγκρίνεσθαι καὶ διακρίνεσθαι λέγει γράφων οὕτως· τὸ δὲ γίνεσθαι καὶ ἀπόλλυσθαι οὐκ ὀρθῶς νομίζουσιν οἱ Ἕλληνες· οὐδὲν γὰρ χρῆμα γίνεται οὐδὲ ἀπόλλυται, ἀλλ᾽ ἀπὸ ἐόντων χρημάτων συμμίσγεταί τε καὶ διακρίνεται. καὶ οὕτως ἂν ὀρθῶς καλοῖεν τό τε γίνεσθαι συμμίσγεσθαι καὶ τὸ ἀπόλλυσθαι διακρίνεσθαι.

B18 Plutarch *On the Face in the Moon* 16; 929b

ὁ μὲν οὖν ἑταῖρος ἐν τῇ διατριβῇ τοῦτο δὴ τὸ Ἀναξαγόρειον ἀποδεικνύς, ὡς ἥλιος ἐντίθησι τῇ σελήνῃ τὸ λαμπρόν, εὐδοκίμησεν.[13]

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11 Here I follow Sider and others in inserting <ἡ>. For a discussion of the text and the insertion, see the Notes.

12 This is Sider's addition. See the Notes on fragment 15.

13 The authenticity of this fragment is in doubt: as Sider notes, the closest parallel, in Plato's *Cratylus* (at 409aff.) clearly refers to 'the Anaxagoreans' rather than to Anaxagoras himself. Nevertheless, Sider goes on to say, 'the fragment seems to reflect Anaxagoras' own doctrine,' and so Sider accepts it. He adds, 'Plutarch, of course, read widely, and in [*On the Face in the Moon*] alone quotes from Heraclitus, Parmenides, and Empedocles' (*Fragments* 158).

B15

And a little later: 'The dense and the wet and the cold and the dark came together here, where <the> earth is now; but the rare and the hot and the dry <and the bright> moved out to the far reaches of the aether.'

B16

He says that those fundamental forms and the simplest things are separated off, and he says that other things that are more composite than those are sometimes compacted as compounds are, and are sometimes separated off as the earth is. For he says the following: 'From these, as they are being separated off, earth is compacted; for water is separated off from the clouds, and earth from the water, and from the earth stones are compacted by the cold, and these stones move farther out than the water.'

B17

Anaxagoras says clearly in the first book of the *Physics* that coming-to-be and passing-away are combining and dissociating, writing this: 'The Greeks do not think correctly about coming-to-be and passing-away; for no thing comes to be or passes away, but is mixed together and dissociated from the things that are. And thus they would be correct to call coming-to-be mixing-together and passing-away dissociating.'

B18

Thus, in his talk, our friend earned approval when he demonstrated this saying of Anaxagoras, that 'The sun places the light in the moon.'

B19 Scholium on *Iliad* 17.547

Ἀναξαγόρας δέ φησιν· ἶριν δὲ καλέομεν τὸ ἐν τῇσιν νεφέλῃσιν ἀντιλάμπον τῷ ἡλίῳ. χειμῶνος οὖν ἐστι σύμβολον· τὸ γὰρ περιεχόμενον[14] ὕδωρ τῷ νέφει ἄνεμον ἐποίησεν ἢ ἐξέχεεν ὄμβρον.

B20

The text identified in Diels as B20 is now agreed not to concern Anaxagoras at all. See the Notes on the Fragments in part 2.

B21 Sextus Empiricus *ad. math.* 7.90

ὁ μὲν φυσικώτατος Ἀναξαγόρας ὡς ἀσθενεῖς διαβάλλων τάς αἰσθήσεις ὑπ' ἀφαυρότητος αὐτῶν, φησίν, οὐ δυνατοί ἐσμεν κρίνειν τἀληθές, τίθησί τε πίστιν αὐτῶν τῆς ἀπιστίας τὴν παρὰ μικρὸν τῶν χρωμάτων ἐξαλλαγήν. εἰ γὰρ δύο λάβοιμεν χρώματα, μέλαν καὶ λευκόν, εἶτα ἐκ θατέρου εἰς θάτερον κατὰ σταγόνα παρεκχέοιμεν, οὐ δυνήσεται ἡ ὄψις διακρίνειν τὰς παρὰ μικρὸν μεταβολάς, καίπερ πρὸς τὴν φύσιν ὑποκειμένας.

B21a Sextus Empiricus, *ad. math.* 7.140

Διότιμος δὲ τρία κατ' αὐτὸν ἔλεγεν εἶναι κριτήρια, τῆς μὲν τῶν ἀδήλων καταλήψεως τὰ φαινόμενα· ὄψις γὰρ τῶν ἀδήλων τὰ φαινόμενα, ὥς φησιν Ἀναξαγόρας, ὃν ἐπὶ τούτῳ Δημόκριτος ἐπαινεῖ.

B21b

See Testimonium A102.

B22 Athenaeus *Deipnosophists* 2.57b

ΩΙΑ. Ἀναξαγόρας ἐν τοῖς Φυσικοῖς [τὸ καλούμενόν] φησιν ὄρινθος γάλα τὸ ἐν τοῖς ᾠοῖς εἶναι λευκόν.

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14 Text following Solmsen; DK print *περιχεόμενον*.

B19

Anaxagoras says: 'We call the reflection of the sun in the clouds a rainbow.' It is a sign of storms; for the water surrounded by the cloud produced wind or poured forth rain.

B20

The text identified in Diels as B20 is now agreed not to concern Anaxagoras at all. See the Notes on the Fragments in part 2.

B21

The pre-eminent natural philosopher Anaxagoras, attacking the senses because they are weak, says, 'Owing to their feebleness, we are not able to determine the truth,' and he proposes as assurance of their untrustworthiness the gradual change of colours. For should we take two colours, black and white, then slowly pour one into the other drop by drop, sight will not be able to determine the gradual changes, although in nature they are real.

B21a

Diotimus said that according to Democritus there were three criteria, and the appearances are the criterion for the apprehension of the unapparent; for 'appearances are a sight of the unseen,' as Anaxagoras says (for which Democritus praises him).

B21b

See Testimonium A102.

B22

Eggs: In the *Physics*, Anaxagoras says that 'egg whites are bird's milk.'

PART TWO

Notes on the Fragments and Testimonia

NOTES ON THE FRAGMENTS[1]

B1: The original state, before *Nous* initiates the rotation that causes the ingredients to separate off and recombine

All things were together, unlimited both in amount and in smallness, for the small, too, was unlimited. And because all things were together, nothing was evident on account of smallness; for air and aether covered all things, both being unlimited, for these are the greatest among all things both in amount and in largeness.

The opening phrase. The version of the fragment more often cited in antiquity is ὁμοῦ πάντα χρήματα ἦν, and it is this that DK printed. In his two most extensive quotations of the fragment (at *in Phys*. 155.26–30 and *in de Caelo* 608.21–23), Simplicius has ὁμοῦ χρήματα πάντα ἦν, and Rösler argues that this is the correct word order. He claims that in these two more complete quotes (only the first gives the fragment in its entirety and the second quotes as far as ὑπὸ σμικρότητος), Simplicius had the text in front of him. Sider accepts Rösler's argument; I follow Rösler and Sider in the text given here. A more literal (but less idiomatic) English translation, closely following that word order, would be 'Together were all things.' Anaxagoras uses the flexibility of Greek word order to stress the thorough blending – the 'togetherness' – of the things in the original state.

Thing; things (χρῆμα; χρήματα). *Chrēma* might seem to be a special or technical term in Anaxagoras, serving to pick out the metaphysically basic

1 The notes consider particular textual issues; in addition, they include discussions of some of the key terms that Anaxagoras uses. They are not meant to be a philological commentary on the fragments; for that, see Sider. Nor are they explications in full of each fragment; the essays provide an account of Anaxagoras's views, weaving together interpretations of the various fragments.

entities in his system.[2] There are reasons to deny this: it is not clear that *chrēma* has this single referent, nor does the word itself appear in all the places where Anaxagoras is referring to what is basic in his theory. In the opening of B4b, for instance, there is a reference to the original state when all things were together where the neuter plural *panta* occurs but not *chrēmata*. In the surviving fragments there are twelve instances of the word *chrēma*, and in eight of these the context suggests that Anaxagoras is referring to the basic things (B1 might be such a case). But in others, the word clearly just means 'thing' in its ordinary sense. Both uses occur in B17 where, in denying the reality of coming-to-be and passing-away, Anaxagoras says that 'no *thing* comes to be or passes away, but is mixed together and dissociated from the *things* that are (*οὐδὲν ... χρῆμα γίνεται οὐδὲ ἀπόλλυται, ἀλλ᾽ ἀπὸ ἐόντων χρημάτων συμμίσγεταί τε καὶ διακρίνεται*).' Here the first use of *chrēma* is the ordinary sense, used to pick out some sensible object, while the second refers to the metaphysically basic entities that are the foundation of the theory.

Amount/extent/number (πλῆθος). Anaxagoras uses *plēthos* frequently, and it is difficult to provide a single English word that can capture the meaning exactly. LSJ link it with *πίμπλημι*, which means to fill or fill up; what fills something can be thought of in terms of number or mass or extent. It sometimes appears paired with *megethos*, as it does at the end of this fragment. In Herodotus, at 1.203, it is so paired and seems to refer to the length or breadth of a mountain range, while *megethos* refers to its height. Thus, we could think of *πλῆθος* in this case as the *bulk* of the range of mountains. The exact meaning will shift depending on what is being discussed; with what we can count, we should probably think of number, with mass terms (or Presocratic stuffs), extent or volume. Anaxagoras seems to use it to mean both number or amount (as in the second use in B1) and extent (as in B2); in its first use here in B1 it may perhaps include both notions: the things in the original mix are unlimited in number (of kinds of things) and amount (there is an unlimited amount of all the ingredients), and the mixture itself is unlimited in extent.[3] Schofield suggests that Anaxagoras may not have 'had a clear distinction between "multitude" and "magnitude" in mind here' at the end of the fragment, and this seems true.[4]

2 See, for instance, Curd *Legacy* for such an interpretation.

3 For a list of the various alternatives that have appeared as a translation of *πλῆθος*, see Sider 71. Sider himself translates it 'plenitude' throughout the fragments. While there is a virtue in having a single translation for each Greek word, in this case the translation will have to be determined from the context.

4 Schofield 155 n. 5.

Unlimited (ἄπειρον). There are six occurrences of this term in the fragments, three of them in B1. It is often translated 'infinite,' especially in Zeno and later Greek philosophy, but here in Anaxagoras it is most likely to have a less technical mathematical meaning. 'Unlimited' is a literal translation, as would be 'indefinite.' Anaxagoras claims that there are no limits on the number and extent of the original ingredients (B1, B2, B4b), that there is no lower limit on smallness (B1), and that *Nous* is not limited in any way (B12). His use of the notion recalls the *apeiron* of Anaximander and unlimited air in Anaximenes. The principle of everything in everything is a fundamental part of his theory, and as a corollary he must maintain that there are no limits on the extent, amount, or degree of mixture of the basic ingredients. He claims that no matter how great the amount of each ingredient we might think there is, there is more than that; no matter how large the mass of the mixture seems to us to be, it is larger than that; no matter how small or submerged in the mix an ingredient is, it can be yet smaller, or submerged yet more.

Smallness, the small; largeness, the large. Like 'thing,' smallness (and largeness) function in at least two ways in the fragments. Sometimes, small and large refer to size; in other cases, as here, Anaxagoras refers to the degree of submergence in or emergence from the background mixture.[5] In the original mixture, nothing is evident because everything is so thoroughly mixed together that nothing stands out against the background. So, nothing discrete is (or would be) discernible. This is not because the ingredients are small in size (what sense could we make of a small piece of the hot?), but because they are thoroughly blended. Later in the fragment, Anaxagoras claims that **air and aether are the greatest** . . . **both in amount (*plēthos*) and in largeness**. Thus, he says both that there is more of these ingredients than any other, and that because of their great quantity they are large with respect to the other ingredients. Aether is the upper layer of the atmosphere, the light upper air.[6] Air (*aēr*) itself is dark, dense, and mist-like, while aether is less dense and brighter. So, overwhelming all the other ingredients, aether and air are semi-emergent from the mix, forming a blend that would prevent any possible perceiver from discriminating the other things in the mix. Air and aether are also mixed with each other, and so, while their prevalence in the mixture prevents other things from being distinguished, neither of them is discriminable from the other. This

5 Here I adopt a version of an interpretation of large and small that was developed (independently) by Inwood ('Anaxagoras') and Furth ('Hero'). There is a fuller discussion in Essay 3.

6 Aristotle suggests that Anaxagoras conflated aether and fire (see A43), but while *pur* (fire) does not occur in the fragments, Aristotle may be correct.

is why Anaxagoras says that they **covered all things**. Air and aether do not merely pervade (as in Sider's translation), but their mixture actually blankets the whole and prevents discrimination. For a discussion of the translation options, see Sider 73–75. (For a fuller discussion of large and small, see Essay 3.)

The end of the fragment. Sider argues that the last clause of the fragment ('for these are the greatest among all things both in amount (πλῆθος) and in largeness') is not part of the original Anaxagorean material, but added by Simplicius to explain why air and aether cover or pervade all things. Sider claims that 'while Anaxagoras thought "both being infinite" sufficient explanation for the preceding words, Simplicius felt the need further to explicate κατεῖχεν.'[7] Yet for Anaxagoras each ingredient can be said to be unlimited or infinite, and so he needs to offer some explanation for why these two cover or pervaded all things, even in the original mix. The final clause offers just such an explanation, and should, I think, be accepted as Anaxagoras's words.[8]

B2 After the rotation begins

. . . for both air and aether are separated off from the surrounding mass, and what is surrounding is unlimited in extent.

Separated off (ἀποκρίνεσθαι). The Presocratic thinkers used the passive of ἀποκρίνειν generally, *to separate*, to mark the separation out or off of basic ingredients: In Anaximander A10 the opposites separate off from the indefinite (the *apeiron*), in Empedocles B9 the separation of the roots from one another is called death by mortals, and in Democritus B167 a 'swirl of all kinds of forms' separates out from the whole. There are also parallel uses in the medical writings of the period, especially in embryology where sperm separates out or off from the parent.[9] This is a fundamental process in Anaxagoras's system, and the passive is particularly appropriate, as the ingredients do not move themselves but are set in motion when *Nous* begins the rotation. As the whirling motion of the rotating mass increases, the force and swiftness of the rotation cause the ingredients to begin to

7 Sider 75–76. Sider also argues that the plural σύμπασι and the datives of respect in the clause are insufficiently Anaxagorean and are thus suspect.

8 See Schofield's review of Sider, 189, as well as Huffman's review, 69–70. Huffman and Verdenius, in his review (404), both argue that the philological points Sider adduces as evidence against the clause are not insurmountable, especially given the philosophical reasons for accepting the clause.

9 A discussion of early (pre-Parmenidean) uses of embryological notions in Presocratic cosmology may be found in Baldry. See Lanza 195.

segregate, to separate off from one another. This separation is never complete, as all things are in all things, but similar ingredients clump or coagulate together until an ingredient is sufficiently concentrated to become larger than those around it (i.e., more emergent from the background); see B12. Anaxagoras uses a series of terms (verbs, participles, and nouns all formed from the same stems) to describe the behaviour of the ingredients once the rotation has begun: separating off as here in B2, in B4a, B4b, B6, B7, B12, B13, and B14; mixing together (*συμμίσγεσθαι*) in B4b (where we have the noun *ἡ σύμμιξις*), B12, and B17; dissociating (*διακρίνεσθαι*), as in B5, B12, B13, and B17; and compacting (*συμπήγνυσθαι*) in B4a and B16. There are also occurrences of things being joined together (*προσκρίνεσθαι*) as a direct contrast to those being separated off (*ἀποκρίνεσθαι*) in B4a and B14. These are reciprocal processes of rearrangement: every separation off produces a mixture, and every dissociation of a mixed or compacted thing results in new mixture or compaction. Anaxagoras seems to have been careful in his choices of which terms to use in different contexts. When he says that an ingredient separates off, or that there is separation (forms of *ἀποκρίνεσθαι*), he refers to the breaking up of the original mass of ingredients, a 'rolling' process that continues, expanding outwards through the indefinitely large mass of the original mix.

From the surrounding mass (ἀπὸ τοῦ πολλοῦ τοῦ περιέχοντος**).** According to Simplicius, B2 comes a little later than B1; thus, it can be read as describing the state of things just after the rotation is begun by *Nous*. Because (as B12 tells us) the rotation began in a small area, expands, and will continue to expand indefinitely, the fragment also describes the state of things now, at the edge of the development of the organized cosmos, where the rotation is pushing its way out through the as yet undifferentiated mass of mixed ingredients. The surrounding mass ('multitude') is unlimited in extent and it contains all the ingredients in unlimited amounts; we could think of it literally as the surrounding 'muchness.'[10] Sider argues that the reading of one manuscript, *πόλου*, should be accepted rather than the *πολλοῦ* reported by the other manuscripts.[11] On that reading, the claim is that air and aether 'separate off of the vault of the surrounding matter' (as he translates). Sider argues that '*πόλου* ... common in the Fifth Century in the sense of *celestial sphere, vault of the heavens, sky* (LSJ), appears the more attractive reading.' But there are reasons to doubt this. If, as it seems, the fragment is primarily describing the first moments after the rotation begins, there is not yet a vault of the heavens formed. Responding

10 In conversation, David Sedley suggested 'muchness' here.
11 Sider 77, 78–79.

to Sider, Huffman suggests that τοῦ πόλου gives too precise a reading for such an early stage: 'the appeal of πολλοῦ is that it is just the sort of indefinite word which we need to describe Anaxagoras' "all things together."[12] This seems right. Moreover, because the rotation is continually expanding, there will always be what we can think of as a boundary between the formed and organized cosmos and the mass of the as yet untouched surrounding mass of ingredients. As the rotation pushes further out and into this mass (unlimitedly far for an unlimited time), air and aether (and other ingredients) will continue to separate off from the indefinite mass.
What is surrounding is unlimited in quantity/extent. 'What is surrounding' is the mass of ingredients that *Nous* sets rotating, and from which the original separation begins. Anaxagoras's universe is a plenum, with no empty space, and what is surrounding is indefinite in *plēthos*. In this context, the suggestion is that there is both an unlimited number of ingredients in the surrounding mass of the mixture, and that there is no limit on the extent of the mass (with Schofield, we could also say that it is unlimited in multitude; see note on B1, above).

B3 Unlimited smallness and largeness; the Eleatic principle maintained

Nor of the small is there a smallest, but always a smaller (for what-is cannot not be) – but also of the large there is always a larger. And [the large] is equal to the small in extent (plēthos), but in relation to itself each thing is both large and small.

This fragment, with its commitment to and explanation of the unlimitedly small and large is both crucial for Anaxagoras's theories and the subject of much dispute. There are both philological and philosophical difficulties.
The small, the large. I take these terms to be used here in their special sense of submerged in and emergent from the mixture (see note on B1). So the claim, that of the small, there is no smallest, but only a smaller, is that no matter how submerged in the mixture an ingredient is, it can become even more thoroughly blended, without thereby being utterly swamped by the other ingredients and so disappearing completely from that area of the mix. Every region of the mixture (no matter how tiny in area) contains all ingredients because there is no downward limit on how submerged an ingredient can be (there are no lower limits on the density of an ingredient in any volume of the mixture). Likewise, there is no upper limit on how emergent an ingredient can be.

12 Huffman, review of Sider, 69.

For what-is cannot not be. The text in the parenthesis, giving the reason why there is always a smaller, is controversial. DK print *τὸ γὰρ ἐόν οὐκ ἔστι τὸ μὴ οὐκ εἶναι* and this is apparently the reading in all the manuscripts (at least there are no variants in the apparatus to DK, in Diels's edition of Simplicius's *Commentary* on book 1 of the *Physics*, or in Schaubach's text); this is an unusual (but not impossible) construction, and I leave it as written.[13] Anaxagoras's claim is that what-is must be; it cannot become what-is-not. Here he follows Parmenides B2.3, where the first route of inquiry is described: *ἡ μὲν ὅπως ἔστιν τε καὶ ὡς οὐκ ἔστι μὴ εἶναι* (the one, that [it] is and that it cannot not be). The difficulty comes from the presence of *τό* and the unusual *μὴ οὐκ εἶναι*. The double negative *μὴ οὐκ* follows the assertion of negative possibility; see, for instance, Smyth 2745, 2746, and especially 2749, where Smyth asserts that 'instead of *μὴ οὐ* we also find *τὸ μὴ οὐ*' with an infinitive depending on a negated verb; in 2749d, Smyth cites Xenophon (*Hellenica* 5.2.36) and Plato (*Soph.* 219e); at 2744.10 he cites Plato (*Phil.* 13a) for similar uses. As Wright notes, 'the construction reads more easily' if we adopt Schofield's deletion of the second *τό*, but this may not be strictly necessary.[14] Zeller suggested converting *τὸ μή* to *τομῇ*; adding <*μή*> gives *τὸ γὰρ ἐόν οὐκ ἔστι τομῇ* <*μή*> *οὐκ εἶναι*, accepted by Sider and translated by him 'For that which is cannot be cut away to nothing.'[15] This would apparently make Anaxagoras aware of Zeno's arguments about divisibility and responding to them. Nevertheless, not only does the emendation not supply an argument against Zeno, Anaxagoras does not seem to be concerned with the paradoxical aspects of division that Zeno exploits; moreover, there is still no argument here about why what-is cannot be cut away to nothing and so why there is no smallest but always a smaller.[16] What we seem to need is exactly the claim in the text: it is impossible that what-is should ever not be. That claim covers more than the possibility of what-is being cut away to nothing, for it also disallows the wholesale removal of an ingredient from a region of the mix or its possible ultimate disappearance by being overcome by indefinitely large amounts of other ingredients (see Essay 3). Further, Diels notes (II.31)

13 For a discussion of the apparent difficulties of the text as printed, see Schofield 156–57 n. 15. Defenders of the manuscript text (with various translations and interpretations) include Lanza, Guthrie, Jöhrens, Raven, Stokes, and Wright (*Presocratics*).

14 See Wright *Presocratics* 124; Schofield 80 and 156–57 n. 15.

15 Both Cornford (*Plato* 56 n. 1; 'Matter' 278) and Jöhrens (who ultimately rejects the emendation; 19) argue that the <*μή*> is necessary for good grammatical sense.

16 As it stands, this is not a reasoned response to Zeno's arguments about division, but simply a retort. For a full discussion of the issue of Zeno and Anaxagoras, see Schofield 80–82 with notes. See also Strang, and Furley 'Response' 60–62.

that the point of the cutting formulation is already included in the sense of the text as it stands.[17]

Large and small are equal in number (*plēthos*). Having just said that there are no limits to the degree of submergence in or emergence from the background mixture (i.e., that there is no smallest and no largest), Anaxagoras now adds the puzzling claim that the large and the small are equal in number. I interpret him as saying that the large and the small are equally complex; that, in Schofield's phrase, 'complexity is not a function of size.' Everything is in everything no matter how small or large (no matter whether we mean size or degree of emergence or submergence). The small and the large are equal in number, because each contains an indefinitely large number of shares of all other things.

Each thing is both large and small. Read in isolation, this might suggest that Anaxagoras is concerned with the physical size of compounded or compacted things or ingredients, saying that any compacted things, or any trace of any ingredient, will be both larger (than something) and smaller (than something else) at any given time.[18] This is a possible interpretation, but it becomes less plausible if we recall, first, that the ingredients in the original mix include both stuffs and opposites, and, then, that in introducing the fragment Simplicius says, 'there is neither a smallest nor a largest among the first principles.' This suggests that Anaxagoras is claiming that each of the ingredients in the mix can be at any time both large and small, that is, submerged and so not manifest as well as emergent and so manifest, depending on the state of things in a given region of the mixture.

The extent of the quotation. In his 1827 edition of the fragments, Schaubach included the sentence that follows B3 (as it appears in DK) as part of the fragment. No other modern editor has accepted the suggestion, and there has been agreement that the sentence is Simplicius's explanation of the quotation. Recently, Lewis has argued that the sentence is a genuine part of the fragment, for the lines give a needed argument to supplement B6's denial of the possibility of pure and isolated (or minimum) stuffs.[19] Sider considered and rejected the possibility on the grounds that the single sentence contains three occurrences of forms of the Attic ἐκκρίνεσθαι, while

17 Diels finds the combination οὐκ εἶναι 'striking' (i.e., odd). For further discussion of the Zeller suggestion, see Jöhrens, Lanza 198; Cornford 'Matter,' Guthrie 2:289 n. 2; Schofield 156–57 n. 15.

18 Thus, we might read Anaxagoras as anticipating Plato's concerns in the *Phaedo* (at 74b and 102bff.) about the co-presence of opposites in a single subject.

19 Lewis 10–11 with note 22. Lewis says, 'The argument structure is clear, and follows nicely from those arguments found in the extended text from Simplicius on Anaxagoras which begins at [*in Phys.*] 164.10' (10).

Anaxagoras uses the Ionic ἀποκρίνεσθαι; this makes it more likely that the sentence is Simplicius's own contribution rather than an authentic quotation from Anaxagoras. Lewis counters that, as Sider himself has pointed out, both Attic and Ionic forms can appear side by side in Simplicius. Nevertheless, in this case, it seems unlikely that the sentence is genuine. First, the clarity of the argument is itself a cause for suspicion. Anaxagoras does not spell out his claims so clearly, normally being fairly dogmatic or leaving completion of inferences to the reader.[20] Second, although both Attic and Ionic forms appear in Simplicius's discussions, he is more careful than might be suggested by Lewis's claim. For instance, Sider notes (78) that at *in Phys*. 174.20ff. both ἐκκρίνεσθαι and ἀποκρίνεσθαι occur; yet the former is in Simplicius's introduction to the fragment he is quoting and the latter in the fragment (part of B12) itself.[21] This suggests that Simplicius uses differences in form with care. All the passages that discuss separation off come from Simplicius, and in those, the form is always the Ionic.[22] Third, the presence of *dokountos* in the sentence (in the phrase 'what seems to be the smallest') suggests that we have someone trying to explain what has been asserted in the quotation, rather than Anaxagoras's own claim; the word appears nowhere else in the fragments. Finally, the sentence fails as an accurate account of Anaxagoras's views: it asserts that there is no largest because there is always something larger out of which something has separated. This is true but not very helpful; after all, everything has been separated off from the original mix. More importantly, the claim ignores B17, which shows that growth by mixture or accretion is also always possible. Because every dissociation or separation off (these are different processes) is also a mixture, any compounded thing or area of an ingredient can become larger by growth or mixture, being added to from what has separated out from the original mix or dissociated from some temporary

20 Schofield discusses the dogmatic nature of the fragments in *Essay*. Even if we think that Schofield has perhaps overstated the case for dogmatism, the sort of structured argument of the sentence is quite unusual. B3 itself includes a good sample of Anaxagorean argument: 'for what is cannot not be' is offered as the reason why there is no least. This is not a complete argument, but points the reader in the right direction to figure out the reason for why there is always a smaller, rather than a smallest. In this, the traditional view of the end of B3 makes B3 rather more parallel with the passage at the end of B1.

21 Diels's apparatus does not suggest disagreements among the MSS here.

22 In private correspondence, Sider says that 'perhaps because ἀποκρίνεσθαι in Attic is such a common word for "answer," Attic writers on Anaxagoras regularly "translated" his ἀποκρίνεσθαι into the less ambiguous (in Attic) ἐκκρίνεσθαι. But Simplicius would never do this in quoting Anaxagoras' exact words.' See now Sider's comments on Lewis in the second edition of his *Fragments* (83).

mixture. Thus, the arguments against authenticity justify rejecting Lewis' claim for the sentence.

B4 Simplicius nowhere quotes this fragment continuously as it appears in DK; Diels constructed it from passages where various quotations overlap. Fränkel argued that the whole passage comes from three quotes that do not belong together. Following him, commentators now usually divide DK's text into two parts, B4a (the first 12 lines of B4 as it appears in DK) and B4b (the rest of the fragment).[23]

B4a Even as things emerge from the mixture and are combined, they still contain everything; the rotation and separation occur both here and 'elsewhere'

Since these things are so, it is right to think that there are many different things present in everything that is being combined, and seeds of all things, having all sorts of forms, colours, and flavours, that humans and also the other animals were compounded, as many as have soul. Also that there are cities that have been constructed by humans and works made, just as with us, and that there are a sun and a moon and other heavenly bodies for them, just as with us, and the earth grows many different things for them, the most valuable of which they gather together into their household and use. I have said this about the separation off, because there would be separation off not only for us but also elsewhere.

Since these things are so it is right to think that (χρὴ δοκεῖν**).** We do not know the conditions to which the antecedent refers. Anaxagoras may be alluding to his earlier claims about indefinite smallness, the original mixture, or the everything-in-everything principle. Simplicius says that the passage occurs 'shortly after the beginning' of the book (*in Phys.* 34.27–28), so Anaxagoras is probably basing the claims of B4a on the fundamental principles of his system. At the end of B4b the whole phrase is repeated following a description of the complete mixture of the original state. The assertion that 'it is right to think' indicates logical force, and although χρή can mean 'it is necessary' in later thinkers, it is probably better to use the older sense of something's being fitting or correct. Here

23 Barnes divides the passage into three parts: the first sentence (from 'since these things' to 'flavours') as B4a; the rest of the paragraph (from 'and human beings' to 'elsewhere') as B4b; and the final part (here B4b) as B4c. Barnes discusses the appearances of versions of B4 in Simplicius at *Presocratic* 624–25 n. 5; a discussion of the history of the divisions of the text by nineteenth- and twentieth-century editors can be found in Sider 90.

Anaxagoras may well be following Parmenides and Melissus.[24] Δοκεῖν, here translated 'to think' can also mean 'to suppose' or 'to believe.' All three of these terms can suggest a weak epistemic state of supposition or 'mere belief,' as we might perhaps say. Nonetheless, having combined it with the modal claim, Anaxagoras here means something epistemically robust: on the basis of the evidence one ought to think (i.e., it would be wrong not to think) what follows.

In everything that is being combined (ἐν πᾶσι τοῖς συγκρινομένοις**).** Another specialized use of a *krinō* verb. The things that are being combined are put together from the ingredients that are separated off (ἀποκρίνεσθαι) from the original mix or that are freed up when another aggregated or combined thing (a temporary mixture) is dissociated (διακρίνεσθαι). The use of the present tense reinforces the point that being separated out, combined, and dissociated are processes that continue indefinitely, as does the mixture of all in all.

There are many different things present. Everything that is combined (these are the natural artefacts) contains a mixture of all the basic ingredients.[25] Anaxagoras's claim is literally that there are 'many and varied' things (πολλά τε καὶ παντοῖα) present in combined things, but B1 together with B3 and B6 will show that everything is in everything.

Seeds of all things having all sorts of forms, colours, and flavours. In addition to the stuffs and opposites, there are seeds of living things in the mixture as well. Some commentators take the καί (*and*) as epexegetical (as having the force of '*that is to say*'), showing that all the things in the mix serve *as though* they were seeds for all things. I do not think that this is correct. Although Anaxagoras is interested in questions of nutrition and growth, that interest is secondary to and dependent on his metaphysical commitments to Eleatic principles of 'no coming-to-be' and 'no passing-away.' The materials in the original mix will produce stuffs and the natural features of the world such as rocks, mountains, rivers, and stars, but Anaxagoras may have felt the need to explain structured living things as well. The seeds deal with that problem. The seeds are growth

24 Parmenides uses forms of χρή and χρεών ἐστι throughout his poem (see, for instance, B1.29, B1.32, B2.5, B6.1, B8.11, B8.54). In Melissus, see B3, B5, B7, B8 (3 times). Mourelatos *Route* 277–78 discusses the question of the translation of χρή and χρεών ἐστι in Parmenides and other early Greek writings.

25 I use the oxymoron 'natural artefacts' to stress that compounded things (plants, human beings, and other animals) are not genuine realities in Anaxagoras's theory. Rather, they are the things that are put together from and are dissociated into the things that are in the processes that we call coming-to-be and passing-away (see B17). Fuller discussion of these claims can be found in the Essays, especially Essays 2 and 3.

points for living things, and contain all the ingredients for the beginning of an organism, in addition to, perhaps, some sort of structural aspect (probably directed by *Nous*). Anaxagoras's claim that the seeds have all sorts of characters cover several aspects of perception: colour is grasped by sight, flavour (or savour, *ἡδονή*) by taste and smell. The slightly unusual use of *ἡδονή* to cover all sorts of flavours can also be found in Heraclitus B67 and Diogenes of Apollonia B5. Form could be the shape of the thing that grows from the seed, or its structure (and Anaxagoras might well see these as related). For a discussion of the seeds (mentioned only in B4a and in B4b), see Essay 2.

Compounded (συμπαγῆναι**)** ... **as many as have soul.** The temporary mixtures, formed from the ingredients that separate off from the original mixtures, are here said to be *compacted* or *compounded*. In B4a the compacted things are human beings and the other living things (as many as have soul), while in B16 earth and stones are said to be compacted. In B16 the agent that compacts the stones is the cold, but there is no mention of that in B4a, perhaps because this fragment is less concerned with the process. The assertion that living things are compounded is linked with B17's claim that there is no genuine coming-to-be or passing-away, but only mixture and dissociation of what is mixed. It also suggests that seeds of living things are not to be understood as miniature versions of the animal or plant, which merely expand by the addition of ingredients (a claim that, in any case, would be inconsistent with B17). Anaxagoras's connection of living things and soul is echoed in B12, where he asserts that *Nous* has control over everything that has soul. This provides evidence for a link between *nous* and soul in an explanation of the seeds.

Works made (ἔργα κατεσκευασμένα**)**. An *ergon* is anything that human beings contrive. The works might include the cultivation of fields, as some translators and commentators have it (see, for instance, Diels in DK, Raven in KRS, Guthrie, and McKirahan). Yet, while that meaning occurs in Herodotus, when he speaks of marvellous *erga*, he as often has in mind such things as architectural works (see 1.93, 186, 2.35) or handicrafts (see 1.51, 3.41).[26] Following Schaubach, Calogero, and Lanza, Sider (98) argues that the phrase should be understood as a reference to 'manufactured items,' saying, 'Manufactured goods would not otherwise be mentioned, whereas products of the soil are mentioned below as if a new point were being made. Moreover, as Calogero notes, *κατασκευάζω* means a "to equip a person, thing, or place with *σκεύη* [vessels or instruments]," and not merely "to prepare," and certainly not anything so specific as "to cultivate," for which LSJ can cite no parallel passage.' In Herodotus, the

26 See the entry for *ergon* in Powell 141.

verb often has the sense of 'prepare' (see 2.44.4). Schofield ('Revisited') translates the phrase as 'buildings that have been manufactured.'

The separation off. The separation off is caused by the rotation initiated by *Nous*.

Just as for us ... not only for us but also elsewhere. These lines suggest that there are other worlds like our own in Anaxagoras's universe. There have been a number of candidates for these other worlds: other places on our Earth, the moon, multiple parallel universes, worlds smaller than ours within our world. It has also been suggested that Anaxagoras is not committed to the reality of these worlds, but is merely engaging in a thought experiment. I suggest that we take Anaxagoras seriously when he says that the rotation occurs not only here but elsewhere, and understand him to be saying that just as the rotation of the original mixture begun by *Nous* produces our world, so it will produce similar worlds in other areas of the rotation. The passage (B4a) begins by saying what must be the case given certain initial conditions; it goes on to explain that the mechanism of rotation will have similar results everywhere because the mix of the original ingredients will behave in the same way as the rotation spreads out through the indefinitely extended mass of ingredients. For full discussion and argument (with analyses of other views), see Essay 5, section 5.2.

B4b A reminder of the state of things before *Nous* initiates the rotation and separation off

Before there was separation off, because all things were together, there was not even any colour evident; for the mixture of all things prevented it, of the wet and the dry and of the hot and the cold and of the bright and the dark, and there was much earth present and seeds unlimited in number, in no way similar to one another. For no one of the others is similar to another. Since these things are so, it is right to think that all things were present in the whole.

Before there was separation off. Sider suggests that ταῦτα is an addition by Simplicius, referring to the χρήματα in B1, which he has just quoted (at *in Phys.* 34.20 – the first part of B4b appears only at 34.21ff.). This makes ἀποκριθῆναι impersonal: Anaxagoras is referring to the state of things before the whole process of separation off begins.[27]

27 Sider 103. Sider claims that if ταῦτα is Anaxagoras's own term, then it refers 'at least to aer and aither ... but not to the dynameis [the opposites].' Yet the fragment describes the state of things before *Nous* has set the mixture rotating. I take it that Sider is correct, and that the fragment is about the state of things before there has been any separation off at all, rather than before certain ingredients have begun to separate.

Not even any colour was evident. Since colour is the most obvious perceptible quality (except, perhaps, for odour), the absence of evident colour indicates the completeness of the original mix and the smallness of the ingredients in the original state. We should remember that there are no observers at this point. Anaxagoras's claim is a counterfactual: were any perceiver present, nothing would be evident to him; rather, such a perceiver would be engulfed in the undifferentiated mixture.

The mixture (σύμμιξις) of all things. Anaxagoras clearly thinks of the original state of 'all things together' as a mixture. In B12 and B14 there are also forms from the verb *συμμίσγω* (the Ionic form of *συμμείγνυμι*): *συμμισγόμενα* (present middle/passive participle) in B12, and *συμμίσγεσθαι* (present middle/passive infinitive) in B17. In those cases, Anaxagoras is discussing the processes that take place once rotation has begun and the original ingredients have begun to be separated. As they are separated off, the ingredients are recombined through mixture, and this process produces the temporary mixtures (the natural artefacts) that constitute the world as we perceive it.

The wet and the dry, the hot and the cold, the bright and the dark, much earth, and seeds. Anaxagoras gives a short list of the things in the original mixture. All the items in the list are given in the genitive; here, the concluding phrase (*καὶ γῆς πολλῆς ἐνεούσης καὶ σπερμάτων ἀπείρων πλῆθος*) has been taken as a genitive absolute, but all could be governed by *σύμμιξις*.[28] In either case, earth and seeds are included in the list on the same level as the opposites (see Essay 2).[29] Earth is a stand-in for the other stuffs (certainly the air and aether of B1 should be thought of here, and perhaps water as well), just as the three pairs of opposites stand in for all the others: dense and rare, mentioned in B12; sweet and bitter, and the other opposites that Theophrastus mentions as necessary for perception (see A92); and so on.

Seeds unlimited in number and in no way like one another. The second of the two mentions of seeds in the extant fragments occurs in B4b, and here Anaxagoras adds that seeds are unlimited in number and unlike each other. All of the ingredients in the original mixture are unlimited in *plēthos* and this includes the seeds. Just as there are unlimited amounts of air and the hot in the mixture, so there is an unlimited number of seeds. Anaxagoras stresses that the seeds are unlike one another; he says this twice. If, as I believe, seeds are starting points for the growth of living things, the actual differences between individuals would be evidence for differences among the seeds (see B21a for appearances as a clue to the unseen). Even if we deny that seeds are complete miniature versions of

28 For discussion, see Sider 104–105.

29 As in B4a, the phrase 'and seeds' is not epexegetical. See note on B4a above.

what they grow into (as we should, see Essay 2), there will still be enough differences among the seeds (even those of the same species) to justify Anaxagoras's claim that no seed is like any of the others.

Since these things are so, it is right to think that all things were present in the whole. In translating ἐνεῖναι as I do, I follow Strang, Furley, Schofield, Barnes, and Sider. As at the beginning of B4a, Anaxagoras argues that one ought to think or believe something on the basis of evidence. Here (unlike the case of B4a) we actually have the evidence: the mixture that constitutes the beginning state contained 'all things.' If we detach the last sentence from the rest of B4b and treat it as an independent fragment, we lose the evidence for the claim.[30] Simplicius gives Diels's version of B4b as a continuous quotation at *in Phys*. 34.21–26, and adds 'and this whole would be the one being of Parmenides.' Although Simplicius is wrong about equating Anaxagoras's original mix with a 'One Being' in Parmenides, the original ingredients are Parmenidean basic entities. Anaxagoras has just enumerated these ingredients in a shorthand way, stressing the presence of seeds and the stuffs and opposites that allow them to grow into living things. On these grounds, Anaxagoras can claim to have shown that everything was ultimately included in the whole that constitutes the original mix. Even those things that will be mixed together or compounded from the ingredients, as in B17, can be said to have been present in some sense, as their ingredients (including the seeds) were part of the mixture. (See Essays 2 and 3.)

B5 The ingredients of the original mixture constitute the total of what there is in the world; they are subject to a principle of conservation

Even though these things have been dissociated in this way, it is right to recognize that all things are in no way less or more (for it is impossible that they be more than all), but all things are always equal.

These things have been dissociated. The referent of 'these things' is unclear. Simplicius quotes B5 only once, after B4a and B4b, and his introduction of the quotation does not say where it was in the original (except that the introduction to the whole series of passages indicates that they came from what Simplicius calls the first book of the *Physics*). The presence of a form of διακρίνεσθαι (to be dissociated) suggests that Anaxagoras is not talking about the separation off of ingredients from the

30 See Schofield 42, who notes this and detaches the sentence, claiming that the proffered conclusion is 'too tenuously linked with the paragraph (Fragment 4b) which it is made to conclude in Diels-Kranz.'

original mixture (for which he uses ἀποκρίνεσθαι). The process of being dissociated is identified in B17 with what is normally called 'passing-away': it is the destruction of a temporary mixture into its constituent ingredients (see also B12 and B13, where διακρίνεσθαι and ἀποκρίνεσθαι appear together). Lacking the context for the passage, it is difficult to know how we should understand 'in this way.' Presumably, Anaxagoras had given some examples designed to illustrate the dissociation of something into its ingredients.

In no way less or more ... **but all things are always equal**. Although the dissociation of a compounded item could suggest that there are now more things in the world than there were (where there was a single item there are now many), that is an illusion, both because all the ingredients were in the original mixture and because perceptible things are mixtures of the original ingredients. There cannot be more than there was originally. The total number/amount of the basic things remains the same (though unlimitedly large).[31] The same principle holds for the mixing of ingredients that results in a natural artefact: despite the convergence of the ingredients into a single mixture, the total is unaffected.

It is impossible that they be more than all. The phrase translated 'impossible' is *οὐ ... ἀνυστόν*, 'it is not to be accomplished.' Parmenides uses the same phrase at 28.B2.7: '... you could not know what is not (for it is not to be accomplished).' Sider points out that *ἀνυστόν* is 'an uncommon word, neither particularly poetic (not in Homer or Hesiod) nor Ionic.'[32] Its appearance in Parmenides, Anaxagoras, Empedocles (B12), Melissus (B2 and twice in B7), and Diogenes of Apollonia (B3) suggests a special philosophical use that may go back to Parmenides.[33]

B6 Nothing can be completely separate; everything is in everything

Since the shares of the large and the small are equal in number, in this way too, all things will be in everything; nor is it possible that [anything] be

31 'Number/amount' covers both the number of kinds of basic things, and how much of each thing. There are never more nor fewer ingredient kinds, and the amount of each ingredient kind remains the same. Suppose that *Nous* had made a list of the basic things at the moment just before it began the rotation. If gold, for instance, is on the list, then (1) it never disappears from the list and (2) the amount of gold remains constant. Moreover, nothing can be added to the list. Dogs, for instance, are not on the list. They are temporary mixtures (natural artefacts) produced by mixture and subject to dissociation. Nevertheless, their ingredients, flesh, blood, bone, hot, wet, etc., are on the list and are subject to the principle of conservation.

32 Sider 109.

33 Sider (ibid.) also notes its use in the medical literature of the late fifth and early fourth century. Jouanna 91 n. 1 has a discussion of its uses in medical contexts.

separate, but all things have a share of everything. Since it is not possible that there is a least, it would not be possible that [anything] be separated, nor come to be by itself, but just as in the beginning, now too all things are together. In all things there are many things present, equal in number, both in the greater and in the lesser of the things being separated off.

Shares (μοῖραι). Anaxagoras consistently uses μοῖρα as a way to refer to a specific (but undesignated) amount of a basic thing: it is a portion or share, but not a particle. 'Portion' or 'share' is noncommittal as to the density of an ingredient in any region of the mixture.[34] A portion of gold in a portion of flesh may be spread smoothly through it or it may be more concentrated in certain areas. Nowhere in the extant fragments does Anaxagoras use 'part' (μέρος), which might suggest particles. Anaxagoras begins with shares of the large and the small, and then generalizes to 'everything'; this would include both stuffs (such as gold or blood) and opposites (such as the hot or the dense), which makes it exceedingly unlikely that he is thinking of the shares (μοῖραι) as particles.

Shares of the large and the small are equal in number. Although Anaxagoras uses the substantives 'the large' and 'the small' here, later in the fragment he uses 'greater' and 'lesser,' apparently with the same meaning. He claims, then, that no matter the comparative size of whatever is being considered, there are an equal number of shares (whatever a share or portion is) in each; the complexity of the mix of ingredients is the same. This principle will hold no matter whether we interpret 'large' and 'small' as the size of the item under consideration, or as the degree of emergence/submergence in the background mixture.

In this way too, all things would be in everything. The principle of equal shares holds for all ingredients: the number of shares of gold in large/small regions of gold are the same, as are the number of shares of the hot in the same regions of gold. B3 had asserted that there is no least, so no ingredient can be reduced to such an extent that it ceases to be present in a region of the mix. Here we see the same thing in a different way: no matter how small something is (in either sense) it contains just as much complexity in terms of ingredients as any/everything else. Thus, in this way too, we can see that everything contains everything.

Separate (χωρίς). To be separate is to be capable of independent existence, apart from everything else. An ingredient or basic entity that was separate in a particular region would be pure, neither mixed with nor containing any other ingredients. Once begun, the process of separation off from the original mix continues indefinitely; nevertheless, as Anaxagoras goes on to

34 See Essays 2 and 3. Barnes *Presocratic* 323–26, and Schofield 75–79 and 107–12, provide arguments for a proportionate interpretation and against the particulate account.

say, no basic thing can ever become completely isolated from everything else ('it would not be possible that [anything] be separated'). The word used in the clause is χωρισθῆναι; this is not one of the family of *krinō* terms that Anaxagoras normally uses to describe either the separation off of ingredients from the original mix or the dissociation of a mixture or natural artefact. This verb is used only here and in B8; in both cases Anaxagoras uses it to refer to a condition of unmixed purity for an ingredient, a condition that he argues is impossible. The principle of 'no least' implies that there is no smallest density of an ingredient that can then be removed. Thus, no pure instance of an ingredient is possible.

All things have a share of everything (μετέχειν). Apply the prohibition against separate existence repeatedly: it will hold of every basic thing in every region of the mixture. All things partake of or share in everything, and all things are in all things. In B6 we find two notions that, transformed, play a fundamental role in Plato: a Form is separate (χωρίς), and sensible particulars (things other than the forms) partake or have a share of the Forms. See the *Phaedo* (100c4–6 and d4–e3) and the *Parmenides*, especially at 128e6–130a1, where both separation and participation are crucial.

In all things there are many things present. The claim that there are 'many things' rather than 'all things' in everything does not constitute a denial of the 'everything-in-everything' principle. (*All things* are indeed *many* things.) Rather, Anaxagoras here seems to be summarizing the point of the fragment, especially as he goes on to say that there are many things **equal in number in both the greater and lesser of the things being separated off**. Whatever separates off from the original mass of mixed ingredients will be complex; neither size nor degree of emergence from the background (the two notions of small/large) affects the complexity of ingredients in what emerges.[35]

35 As Schofield puts it, following Strang (366), Anaxagoras's point is 'about the irrelevance of size to complexity of composition' (*Essay* 90). Barnes and Schofield take the first *kai* in the last sentence of the fragment as 'even' rather than 'and'; translating as 'And in all things there are many even of the things that are separating off . . . ' Schofield glosses the thought this way: 'In the world as it now is, there are many distinct substances which have been separated, are being separated, and will be separated off. But it remains the case that in everything, however large or small, there is a portion of everything – even of the substances which collect together in distinct concentrations. In short, all things are in everything, despite separation' (160 n. 42; Barnes's interpretation, *Presocratic* 338, is similar). Despite Schofield's claim that this makes better sense of the placement of τῶν ἀποκρινομένων, the sentence structure remains awkward. I take it that the point is that despite separation off, there are many things (even everything) in everything, and that this is true no matter the degree of separation off.

B7 On the unlimitedly many things in the original mix

. . . so as not to know the extent of the things being separated off, either in word or in deed.

The things being separated off. Both Simplicius's evidence in the context of the fragment and the use of τὰ ἀποκρινόμενα show that Anaxagoras is talking about the ingredients in the original mixture. Because the original context is unknown (there is only the one fragmentary quotation in Simplicius' commentary on *De Caelo*), Anaxagoras's meaning is unclear. That the ingredients are unlimited is asserted in other fragments (see B1, B2, B4b); here Anaxagoras stresses that their exact number and extent are beyond human comprehension.[36]

Extent. πλῆθος covers both the unlimited number of kinds of things in the mix and the unlimited quantity of those things.

Word or deed. Sider states that this version of the phrase, 'with λόγος (rather than [the Homeric] ἔπος) and datives occurs in extant literature first in Anaxagoras' (115). We can neither count nor apprehend purely by thought the indefinite number of things that separate off. The use of the phrase 'word or deed' stresses the human scale; although cosmic *Nous* can know the extent of the ingredients and their natures (see B12), such comprehension is beyond human ability.

B8 Complete segregation of any ingredient into a pure instance is impossible; all things are together not only in the original mixture but also now

The things in the one kosmos have not been separated from one another, nor hacked apart with an axe – neither the hot from the cold nor the cold from the hot.

The things. Although he does not reserve *chrēmata* for the ingredients, using it for both ingredients and those things mixed together or compounded from them after they begin to separate off (e.g., in B17), Anaxagoras here uses the neuter plural definite article, which is more indefinite than *chrēmata*. He may desire to emphasize that the complete mixture of the original state continues even as the cosmic rotation causes separation off.

In the one *kosmos*. The phrase ἐν τῷ ἑνὶ κόσμῳ might indicate Anaxagoras's explicit commitment to a single world.[37] Whether or not Anaxagoras posits different regions of separation, there is but a single mass of mixed

36 Although he maintains that we cannot comprehend the *plēthos* of the contents of the original mixture, Anaxagoras does not adopt a broad scepticism. See Essays 4 and 5.

37 See, for instance, Guthrie 2:313.

ingredients that constitutes the original state of things before the rotation begins. See also B4a and Essay 5.

Have not been separated nor hacked apart with an axe. The perfect passives indicate that the completely mixed state of the original mass continues. Just as in B6, the word for 'to separate' is a form of χωρίζειν, related to the adjective χωρίς, which implies a pure or unmixed state; also as in B6, Anaxagoras rejects the possibility of such a state. The impossibility is restated graphically: things are so mixed that they cannot be hacked apart even with an axe. A *pelekus*, the axe in question, is a mighty double-edged weapon used for felling trees or opponents in battle; so 'hacked apart' seems an appropriate translation here. Unlike physical bodies, which can be dismembered, the ingredients of the *kosmos* cannot be parted one from another. Anaxagoras uses the example of hot and cold: a pair of opposites, which might be thought to repel one another; even they are inseparably mixed.[38]

The end of the passage. The further parenthetical comment – 'for there is not anything pure by itself' – at the end of Simplicius's quotation might be part of the fragment. See Sider 117.

B9 The speed and force of the rotation

. . . as these things are revolving in this way and being separated off by force and swiftness (the swiftness produces force), and their swiftness resembles the swiftness of nothing that is now present among humans, but is altogether many times as fast.

These things are revolving and being separated off. The present tense indicates that the processes continue. *Nous* began the rotation in a small region, but once begun, the rotation continually spreads out through the unlimited mass of mixed ingredients. The claims about swiftness and force apply, then, at all times.

Force. Although it is the force (βία; Ionic, βίη) of the rotation that causes the ingredients to separate off from the original mixture, the force itself is caused by the rapidity of the rotation.

Swiftness. If the rotation continues, and the rapidity is such as to produce a force capable of tearing apart the original mix, why do things appear more or less stable now? Anaxagoras says that the rotation that caused the initial separation off and that continues to produce it (at the edges of the expanding rotation, see B12) is very much faster than what occurs in the region of the cosmos that we occupy. B12 asserts that the rotation began

38 Perhaps Anaxagoras may have Heraclitus's unity of opposites in mind.

in a small volume of the original mixture and spread out; the implication of that fragment with this one is that while the moving edges of the whirl retain the original swiftness imparted by *Nous*, other areas of the rotation (or of any sub-rotation produced in the main whirl) slow down. Thus, although we live among the effects of the great original swift rotation, it has moved on, and we are not directly aware of its continued action on the outer edges of the developing cosmos. We may have hints of it through seeing the vast rotary motions of the system of the heavenly bodies (see B21a and Essay 5).

B10 The Eleatic principle at work

For how can hair come from what is not hair, and flesh from what is not flesh?

The authenticity of B10. The question that DK print as fragment 10 is part of a scholium on Gregory of Nazianzus, which gives us an account of growth in Anaxagorean terms.[39] Schofield originally argued that the ultimate source is probably Eudemus of Rhodes and that the question is not a genuine quotation from Anaxagoras.[40] The argument rests in part on Schofield's rejection of questions of growth and nutrition as the prime motivation for Anaxagoras's theory, arguing that Anaxagoras was moved by metaphysical rather than biological interests. Most scholars have not followed him in denying the authenticity of B10.[41] Schofield is certainly correct that a fundamental motivation for Anaxagoras's view of the original mix was a metaphysical view that denies the reality of coming-to-be and passing-away. Yet Anaxagoras's commitment to Eleatic metaphysics, which is surely behind the repudiating question (the scholiast explicitly mentions the principle that nothing comes from nothing, a version of the Eleatic claim), is compatible with an explanation of the apparent facts of growth and nutrition, and indeed one who accepts Eleatic principles will need to provide an explanation of how these are even possible. The link

39 Lanza has a discussion of the context of the scholium; it is a comment on a funeral oration by Gregory in which he alludes to the ancient doctrine of everything in everything (Lanza 219–20).

40 See Schofield 'Doxographica.' Sider evaluates the Eudemian evidence, finding reason to agree with Schofield's claim about the source of the scholium, and argues that '[s]ince Eudemus is one of the few ancient authors to have consulted the text of Anaxagoras, the likely tracing of the scholium back to him keeps open the possibility that B10 is genuine. In the absence of evidence to the contrary, it deserves to keep its place as an Anaxagorean fragment' (*Fragments* 121–22; the passage quoted appears on 122).

41 See especially Mansfeld's convincing remarks in his *Mnemosyne* review of Schofield's *Essay*.

between metaphysics and an explanation of ordinary phenomena is made explicit in B17.[42] B4a and B4b indicate the role of seeds in the original mix, and the scholiast's comments provide evidence that Anaxagoras's seeds are biological growth points (although the scholiast uses the Greek word *γονή* rather than *σπέρμα* as in B4a and b). There is, I think, no compelling reason to reject its authenticity.[43]

Hair and flesh from what is not hair and not flesh. The question applies the Eleatic denial of what-is-not to specific entities. Just as what-is cannot come from what-is-not, so what is something cannot come from what is not that thing. This application of the Eleatic principle gives Anaxagoras a metaphysical reason for adopting the ingredient stuffs and opposites as basic. Phenomenal objects, as B17 shows, are artefacts insofar as they are constructed (mixed together) from the things that are (the ingredients). This holds for living things that are 'natural artefacts' and for those things produced by human beings (both human-made artefacts and the things mentioned in B4a).

B11 Mind and things

In everything there is a share of everything except Nous, but there are some things in which Nous, too, is present.

In everything there is a share of everything. For share (*μοῖρα*), see the note on B6. In B6 Anaxagoras had said that 'all things *have* a share of everything (*πάντα παντὸς μοῖραν μετέχει*),' and the same claim is repeated in the opening of B12. Here the claim is turned around to say that there is a share of everything *in everything*. The two remarks make the same point, but from different perspectives; B6 begins from the item that has shares of everything, B11 from the ingredients that are in every item. The principle of everything-in-everything holds for all the stuffs and opposites (the basic ingredients) and for all the things constructed from them.

Except *Nous*. Here in B11, Anaxagoras tells us nothing about the powers of *Nous*, only that it is an exception to the everything-in-everything principle. He is quite emphatic about excepting *Nous* from the general principle (the reasons for this become clearer in B12). Anaxagoras discusses *Nous* in

42 In his later *Essay* (133–143), Schofield modifies his view somewhat, saying that 'the ultimate author of the scholium may ... preserve Anaxagoras' own words in his repudiating question; even if he does not, his account of Anaxagoras' theory of growth may be based in part upon his own consultation of Anaxagoras' book' (140).

43 In support of authenticity, Wright argues that 'the point made suits Anaxagoras's position; the question appears too forceful to have been invented by a compiler, and such rhetorical flourishes are in the Presocratic tradition,' citing Parmenides B8.7–8 and Empedocles B17.32–33 (*Presocratics* 128).

four of the extant fragments: B11, 12, 13, and 14. It is usually translated 'mind,' but it is not clear that Anaxagoras's notion is best captured by that single word.[44] *Nous* is a rational moving principle, so in some cases the presence of *Nous* explains why the thing in question has a mind; in others, it is merely the motive quality of *Nous* that is present. In all cases, the presence of *Nous* is adduced to account for ordered change and repeatability. Finally, in the case of the great *Nous* that begins and controls the rotation bringing about the ordered universe, Anaxagoras conceives of a supreme principle of order that may or may not be divine. In this, he is like Heraclitus, for whom *Logos* is a supreme principle of order and shares in some of the traditional attributes of the divine. The ordering principle, as both mover of the world and as intelligence that pervades it, guarantees the intelligibility of the universe. Aristotle thought that Anaxagoras failed to distinguish clearly between soul and mind (*De Anima* 1.2, A100; in A55 he says that 'Anaxagoras assigns knowing and moving to the same principle'); the evidence of B11 and B12 supports Aristotle.

***Nous* is present in some things.** Although *Nous* is not subject to the everything-in-everything principle, it is present to some things, although here we are not told what things contain *Nous*. In B12 Anaxagoras says that *Nous* controls all things that have soul, and this suggests that it is therefore in those things. The phrase in B12 is 'as many as have soul.' That

44 Menn, for instance, claims that in such assertions as appear in B12 (that *Nous* ordered and knew all things) the term is best understood to mean 'rationality itself' or 'rationality as such' (Menn 28). He says that 'for Anaxagoras the "abstraction" of rationality is a substance just as concrete as air or fire or gold, present within all rational beings' (28). This is all part of what Menn deems Anaxagoras's 'decidedly archaic' world picture (27). It seems to me that it is an open question whether *Nous* is the same sort of thing as gold or air or fire (see the note on B12 on the fineness and purity of *Nous*). Moreover, while it is clear that *Nous* is a rational principle, and that *nous* in human beings is connected with our being rational creatures, it is less clear that the presence of *nous* in plants and other animals (as many as have soul) should be understood as the presence of rationality in them or that this rationality is present to them as an ingredient in just the same way as wood or water is an ingredient. Menn does not directly address the question of what it means for a plant to have *nous* in it, other than to deny that it means that the plant has 'a soul capable of participating in prudence'; rather, he says, 'it is clear that Anaxagoras thinks that rationality controls Socrates or the sun or a tree and produces regular patterns of motion in them – not by being present in their souls but by being present in their bodies' (28–29; italics omitted). Anaxagoras nowhere says this: he neither equates soul and *nous* nor denies a connection between them; he simply says in B12 that *Nous* has control over 'as many as have soul,' and says in B11 that *Nous* is in some things. Menn asserts that there are portions of *Nous* in things, which have them by participating in *Nous* (26–27). But, again, Anaxagoras nowhere uses participation or portion language in talking about *Nous*; in B11 and B12 he stresses that the presence of *Nous* in things is different from the presence of ingredients (and that difference is not merely one of quantity, as Menn suggests on p. 26).

phrase also occurs in B4a, where it specifically refers to human beings and other living things. Anaxagoras nowhere says that things partake of a share of *Nous*, or that there are shares of *Nous* in things; rather he simply says that *Nous* is *in* some things. Thus, the presence of *Nous* in things is not analogous to the occurrence of the basic ingredients in each other, and *Nous* is not to be considered as simply one more ingredient among all the others or on an equal footing with them. Its role as mover and knower makes it significantly different from every other basic (i.e., genuinely real) thing. B12 stresses that *Nous* is not a part of the original mixture as an ingredient, but is rather the ruler and controller of the ingredients.

B12 The powers of *Nous*; the revolution and separation off

The other things have a share of everything, but Nous is unlimited and self-ruling and has been mixed with no thing, but is alone by itself. For if it were not by itself, but had been mixed with anything else, then it would partake of all things, if it had been mixed with anything (for there is a share of everything in everything just as I have said before); and the things mixed together with it would thwart it, so that it would control none of the things in the way that it in fact does, being alone by itself. For it is the finest of all things and the purest, and indeed it maintains all discernment (gnōmē) about everything and has the greatest strength. And Nous has control over all things that have soul, both the larger and the smaller. And Nous controlled the whole revolution, so that it started to revolve in the beginning. First it began to revolve from a small region, but it is revolving yet more, and it will revolve still more. And Nous knew (egnō) them all: the things that are being mixed together, the things that are being separated off, and the things that are being dissociated. And whatever sorts of things were going to be, and whatever sorts were and now are not, and as many as are now and whatever sorts will be, all these Nous set in order. And Nous also ordered this revolution, in which the things being separated off now revolve, the stars and the sun and the moon and the air and the aether. This revolution caused them to separate off. The dense is being separated off from the rare, and the warm from the cold, and the bright from the dark, and the dry from the moist. But there are many shares of many things; nothing is completely separated off or dissociated one from the other except Nous. All Nous is alike, both the greater and the smaller. Nothing else is like anything else, but each one is and was most manifestly those things of which there are the most in it.

The fragment. Simplicius quotes parts of B12 at *in Phys.* 164.24–25, and 176.32–177.6; the longest quotation is at 156.13–157.4, where he says, '[Anaxagoras] has written this about *Nous*.' This could suggest that in B11,

B12, B13, and B14 Simplicius has quoted everything that he had available about *Nous*.[45] Although the passage at 156.13 omits the first clause (included at 164.24), Simplicius may not have thought that the clause needed to be included in a discussion of *Nous*, since (given B11) it refers only to the things other than *Nous*.

The other things have a share of everything ... As in B6, Anaxagoras confirms the mixture of all in all and, in the phrase 'having a share,' he uses the same language. In B6 he had said that 'all things (*panta*) have a share of everything.' Because he will go on to show that the general principle applies only to the basic ingredients and not to *Nous* (explaining why *Nous* is an exception), he says here that the *other* things (*ta alla*) partake of a share of everything. As the rest of the fragment will argue, *Nous* is unlike everything else in many ways.

***Nous* is unlimited and self-ruling and has been mixed with no thing, but is alone itself by itself.** B11 claimed that *Nous* does not partake of a share of anything else (although it is in some things). Anaxagoras now begins a larger discussion of the character of *Nous*, and stresses its difference from the things that constitute the ingredients of the original mix. The claims that *Nous* is an unlimited, self-ruling, unmixed thing, and thus alone 'itself by itself,' are connected. In stating that *Nous* is unlimited (*apeiron*, an unlimited thing), Anaxagoras employs a term that he uses elsewhere with a number of meanings (see the note on B1). Here Anaxagoras asserts that there are no limits at all on *Nous*; for it is neither spatially limited nor limited in its powers. Moreover, there is no limit on the extent of *Nous* in the cosmos (however we might measure this). The claim that *Nous* is self-ruling means that it is not governed or moved (and hence changed) by anything except itself. *Nous* alone makes decisions and moves things. Further, B11's assertion that *Nous* is excepted from the principle that everything partakes of a share of everything is rephrased by saying that it is not mixed with anything. The emphatic wording (*μέμεικται οὐδενὶ χρήματι*) shows that there is no level at which *Nous* could be part of any mixture (either as an ingredient or as having other ingredients mixed into it), since Anaxagoras uses *chrēma* to refer to both the basic ingredients and natural artefacts, the temporary mixtures of those ingredients. The complete independence of *Nous* is summed up by the claim that it is 'alone itself by itself,' that is, it does not depend on anything else for its existence, either logically or causally.[46] Anaxagoras's phrase (and both the

45 This could also mean that these were the passages about *Nous* that Simplicius found most congenial to his discussions, and that he omitted other parts of the book that also dealt with *Nous*. We simply do not know how much Anaxagoras wrote on the topic.

46 The ingredients of the original mixture, as basic entities, are also metaphysically independent, since each has an independent nature, but they are subject to the external

independence and causal efficacy of *Nous*) is recalled in Plato's descriptions of the Forms (see, for instance, *Phaedo* 78d5 and 100b6, *Parmenides* 130b8, *Symposium* 211b1). See also the note (above) on the words at the end of Simplicius's quotation of B8.

If *Nous* were mixed with anything it would partake of everything. The next sentence begins to give the reasons why *Nous* is alone by itself. Anaxagoras claims that the mixture of *Nous* with something else (i.e., its mixture with anything at all) would entail its mixture with everything (and so, it would partake of everything). All the basic ingredients partake of each other and are actually inseparable. Thus, the admixture of what seems to be a single ingredient will actually bring with it all the ingredients. In this sentence, Anaxagoras moves smoothly between the notions of being mixed with and partaking of. This suggests that he sees no difference between the two notions. Being mixed with (or into) *X* is the same, for him, as having a share of *X*. Moreover, the relation is symmetrical. If *X* is mixed with *Y*, then *Y* is mixed with *X* and each has a share of the other. Nevertheless, as B11, B12, and B14 make clear, *Nous* is always present to the cosmos, directing everything that happens and in all living things (i.e., 'as many as have soul').

The things mixed with *Nous* would thwart it. While Anaxagoras insists that *Nous* must be unmixed if it is to rule as it does, he does not explain why being mixed with other things would hinder or thwart *Nous*' activity. His argument might depend on the fineness and purity of *Nous*, taking it that its 'ability ... to know and control things ... would become ineffective if νοῦς were mixed with grosser matter like flesh or earth, and as it were submerged by them.'[47] This would entail that *Nous* is weaker than the other things; something Anaxagoras clearly denies. Perhaps Anaxagoras thinks that, mixed with things that are inert, *Nous* would lose its power to move things.[48] Again, this is inconsistent with the claim that *Nous* has all strength and all control. So far in B12, Anaxagoras has asserted that *Nous* has a character unlike the ingredients of the original mixture and the compounded things that are compacted or mixed together from them, and he is clearly at pains to claim that *Nous* is radically different from everything else, and not to be understood simply as one ingredient among the rest. B11 emphasizes that *Nous* is exempt from the everything-in-everything

causal influence of *Nous*, and because they are mixed together, each can be submerged in the greater densities of other ingredients in local regions of the mix.

47 The quoted phrase comes from Schofield 148 n. 39; Schofield himself does not adopt this view.

48 This possibility is canvassed by Barnes (*Presocratic* 409), who rejects it.

principle, and *Nous* is not treated as an ingredient in the original mixture when *Nous* sets it in motion. Perhaps Anaxagoras supposed that were *Nous* an ingredient that behaved as the other ingredients do, then, in order for a living being to be said to manifest mind, *Nous* would have to predominate in the temporary mixture in the same way as flesh or blood do (see the note on the end of B12, p. 65, for the principle of predominance).[49]

***Nous* is the finest and purest of all things.** This clause both follows the previous claim about the difference between *Nous* and the other ingredients and introduces new claims about the character and power of *Nous*. In using the superlatives finest (*leptotaton*) and purest (*katharōtaton*) Anaxagoras is again calling attention to the fundamental difference between *Nous* and the ingredients in the mix. The purity (or clarity) of *Nous* denotes its unmixed state, while the assertion about its fineness shows that it is the most rarified of all things. There is disagreement about whether Anaxagoras conceives of *Nous* as a material body or as something immaterial.[50] The claims about fineness and purity are important for this question, but do not by themselves determine the issue. Nevertheless, it is quite possible that Anaxagoras uses these terms to describe something that is not material at all.[51] That the early Greek thinkers were certainly capable of conceiving a non-material entity is clear from Melissus, who argues (at DK 30B9) that the One does not have a body (*sōma*).[52] If *Nous* is immaterial, then its fineness and purity (which is a consequence of be-

49 Similarly, as an ingredient of the same type as the others, *Nous* could be added to or extracted from an entity as nourishment is added or blood is shed.

50 A summary of views on the question of the material or immaterial nature of *Nous* may be found in Lanza 222–24. Recent materialists: Barnes (406–409), Sider (97–98), Menn; non-materialists: Guthrie (2:276–78), Furley ('Soul'). Schofield (11–12) opts for a middle view, grounded in Aristotle's analysis, that 'mind has no specific characteristics of its own ... conceived on the analogy of a tablet or constituent stuff in one's head ... featureless, the tablet not made of anything and with no physical properties (except, perhaps, spatial ones).' For a discussion of the immaterialist option, see Guthrie 2:276–78.

51 Guthrie points out that λεπτός is used from Homer on in ways that do not force a material interpretation (2:276–77 with 277 n. 1, where Guthrie notes that *leptos* 'is applied to *νοῦς* itself in Eur. *Med.* 529, and in fifth-century literature also to *λῆροι*, *φρένες*, *ἐλπίς*, *μῦθοι*').

52 Sider argues that 'the partitive genitive [*λεπτότατόν τε πάντων χρημάτων καὶ καθαρώτατον*] seems to indicate that Nous is among the class of corporeal things, differing in physical makeup from other substances in alone being purely homogeneous' (131). This makes the case only if we insist that Anaxagoras uses *chrēma* and *chrēmata* exclusively to refer to the basic ingredients in the mix. As we have seen, he also uses these as general referring terms, meaning 'any thing whatever.' The point could be that nothing else is like *Nous* in being incorporeal, so the class of comparison just would be everything else, or 'all things.'

ing unmixed with or partaking of a share of other things) would be both guaranteed and explained.

***Nous* maintains all discernment.** This is the first direct mention of *Nous*' cognitive power in B12 (although such power is implied by the fact that *Nous* rules all things). The term used here, discernment (*gnōmē*), implies the capacity for wise or intelligent decision making. Given that *Nous* both controls the rotation and rules all things, it must be understood as a practical intelligence or principle, capable both of knowing how things are and acting in the light of knowledge. That *Nous* has understanding or knowledge as well as practical wisdom is implied by the claim that *Nous* has all discernment about everything (*peri pantos*) and by the claim, later in B12, that *Nous* knew all the things that were in the mix and that are and will be separated off. (For fuller discussion, see below and Essay 4.)[53]

***Nous* has the greatest strength.** In order to rule and order all things, *Nous* must have great strength; and Anaxagoras here asserts that it enjoys the greatest strength, that is, has the greatest power. The Greek phrase '*καὶ γνώμην γε περὶ παντὸς πᾶσαν ἴσχει καὶ ἰσχύει μέγιστον*' with the echoing '*ischei* (maintains)... *ischuei* (strength)' is consistent with Anaxagoras's 'high-minded style' (Diogenes Laertius; A1) and provides a link between the practical wisdom of *Nous* and its power, underlining the claim that *Nous* controls all things through its governance of the revolution that breaks up the mass of mixed ingredients and produces the cosmos.[54]

***Nous* has control over everything that has soul.**[55] A consequence of *Nous*' possession of the greatest strength is its power to control everything, and Anaxagoras makes that point here, although he may seem to limit the power of *Nous* by restricting it to everything that has soul. This might suggest that the inanimate mass of ingredients is not subject to *Nous*. That this is not the case becomes clear in the following sentences that describe *Nous*' control over the great cosmic revolution. Here Anaxagoras concentrates on the power of *Nous* in things that have soul, that is, all living things (both plants and animals would seem to qualify as things that have *Nous* in them, see B4a and B11). While it might seem odd to think of plants or even some animals as possessing mind or reason (*nous*) and thus being controlled by *Nous* that way, this becomes less bizarre if

53 Different (and differing) accounts of *Nous* can be found in Laks 'Mind's Crisis' and Lesher 'Mind's Knowledge.'

54 For further discussion of the relations between the various claims about *Nous*, see Schofield (10–22) and Lesher ('Mind's Knowledge').

55 In DK this clause is connected to the preceding one (the claim that *Nous* has the greatest strength) by a semicolon. Sider prints a period, and this seems right. The claim about *Nous*'s control of everything with soul is a lead-in to the cosmological claims that follow.

we begin by noting that the growth and patterns of life of such beings are ordered and so repeatable and explicable rather than capricious, and thus rational or intelligible in the sense that they embody coherent patterns that are amenable to rational explanation. This repeatability and susceptibility to explanation is true of the whole universe (as Anaxagoras makes clear when he repeatedly stresses that *Nous* controls the revolution that brings the universe into an ordered state), and so it cannot be the whole of what Anaxagoras means by speaking specifically of the control that *Nous* has in things that have soul. Sider suggests that all living things share with *Nous* various degrees of cognitive, kinetic, and causal efficacy.[56] This seems right, particularly if we add that living things are able to respond to their environments and, in some cases, reshape that environment. Aristotle, who distinguishes the nutritive, perceptual, and rational aspects of soul (e.g., *De Anima* 2.2 413a20–25), argues that Anaxagoras failed to distinguish between soul and *Nous* and the claim here appears to support his analysis. Anaxagoras's distinction between the larger and the smaller of things that have soul refers to larger or smaller living things; even the smallest plant or flea is controlled by *Nous*, as are human beings and even larger animals.

***Nous* begins and controls the revolution.** With this sentence, Anaxagoras turns to the role of *Nous* in the great revolution that forms the cosmos. He is continuing to explicate the claim that *Nous* has all discerning judgment and the greatest strength. Not only are these exhibited in the behaviour of living things, they are also responsible for the appearance and behaviour of the cosmos. *Nous* began the revolution and still directs it. It is important to note that *Nous* acts here as efficient cause: *Nous* does not create the cosmos insofar as the ingredients in the original mix are themselves metaphysically basic, and neither come to be nor pass away.[57] *Nous* is responsible for the arrangement of things insofar as that arrangement results from the revolution that it begins and oversees.

The revolution begins in a small region and expands. The undifferentiated mixture that is the mass of the original ingredients is unlimited in extent (B1). When *Nous* sets the mass revolving, it does not affect the entire mixture at once. Rather, the revolution begins in a small locale and expands, increasing in extent (B13). Assuming that our cosmos is near the centre of the whirl (see Essay 5), and that the expansion is outward, the swiftness is greater at the moving edge than it is in our region (see B9).

***Nous* knew (*egnō*) them all: the things that are being mixed together, and the things that are being separated off and the things that are being**

56 *Fragments* 133.

57 See the discussions in Louguet and in Essay 5.

dissociated. Although it is the efficient cause of the universe, *Nous* is not a blind cause. Anaxagoras has already asserted that *Nous* has all discerning judgment about everything, and here he implies that *Nous* knows or understands what is in the original mixture and how these ingredients will behave once the revolution has been set going. Some recent commentators have suggested that in saying that *Nous egnō* all things, Anaxagoras does not mean to assert that *Nous* has genuine knowledge of the basic ingredients in the mixture.[58] Yet it is difficult to see how *Nous* can oversee, control, and arrange all things without knowledge of the natures of the ingredients in the mix. Only with such knowledge can *Nous* genuinely arrange and direct the universe, and understand what mixtures will emerge from the ingredients that have been separated off from the original state of all things together. The extent of *Nous*'s knowledge is stressed in the Greek where the objects of understanding come first in the sentence. More literally, the sentence says: 'And the things that are being mixed together, and the things that are being separated off and the things that are being dissociated, *Nous* knew them all'; this rather solemn word-order, with its opening list, emphasizes the all-encompassing understanding of *Nous*. The participles cover all stages of the rotation and all of the various processes that take place (see also the note on B2). Being mixed together is the process that we could call 'coming-to-be;' it takes place through the mixture of the ingredients and produces the natural artefacts (see B4a and B17). Separating off occurs as the mass of original ingredients are broken up by the rotation, and being dissociated is the process that both begins the separation off of the ingredients (see B13) and the coming apart of the temporary mixtures that constitute animals and plants. In B17 Anaxagoras says that although there is no genuine passing-away, we can call being dissociated (διακρίνεσθαι) by that name. These terms cover all the various processes that occur; that *Nous* knew all the things undergoing them suggests that *Nous* enjoys a comprehensive understanding of the natures and characteristic behaviours of the ingredients in the original mix and so also understands what will emerge as the revolutions continue.

All these *Nous* set in order. The solemn recitation of *Nous*' power continues. After saying that *Nous* has control over all things, and has knowledge of all things, Anaxagoras now adds that *Nous* ordered or arranged all things (πάντα διεκόσμησε νοῦς). Thus, in Anaxagoras's universe, *Nous* has

58 Laks ('Mind's Crisis') suggests that *Nous* must separate the ingredients in order that they be knowable (and that such separation is impossible); Lesher says that the claim that Mind *egnō* all things is to be understood as 'Mind decides or determines everything . . . ' ('Mind's Knowledge' 139; but see 141–42). See also Essays 4 and 5.

put its knowledge and powers of control to work in bringing about order and arrangement through the rotation. Just as in the preceding claim, where what *Nous* knew is enumerated, so here too Anaxagoras lists what *Nous* arranges in order to show that its ordering is both pervasive and comprehensive: it set in order 'Whatever sorts of things were going to be, indeed whatever sorts were and now are not, and as many as are now and whatever will be.' The inclusion of past, present, and future is traditional, but should not be taken to mean that Anaxagoras allows the possibility of genuine coming-to-be or passing-away.[59] The things that were, are, or will be are the natural artefacts that result from the combination and separation of the basic ingredients. These mixtures are inherently temporary. Anaxagoras's point is that insofar as these are arrangements of ingredients produced in an orderly fashion by the revolutions begun by *Nous*, they owe this order to the action of *Nous*. Once more Anaxagoras stresses that the universe is not a random collection of items, but a *kosmos*, an ordered arrangement, whose order can be traced to *Nous*.

And *Nous* also ordered this revolution ... We have just had a general statement of the ordering power of *Nous*; Anaxagoras now turns to one way in which that power is at work. 'This revolution, in which the things being separated off now revolve, the stars and the sun and the moon and the air and the aether' refers both to the large general rotation that began in the original motion imparted by *Nous* and that Anaxagoras has already mentioned, and to that part of the rotation apparent to us in which we see the heavenly bodies that move in our heavens. The general reference here to the things being separated off (*οἱ ἀποκρινόμενοι*) recalls that it is the rotating motion that causes the first separations, probably of air and aether, from the original mixed mass of ingredients (see B1 and B2). The continued rotation causes the formation of the heavenly bodies, and Anaxagoras's specific reference to the fact that '*Nous* arranged *this* revolution' (*διεκόσμησε νοῦς ... καὶ τὴν περιχώρησιν ταύτην*) in which the stars and the sun and the moon '*now* (*νῦν*) revolve' could perhaps be a reference to our particular world as opposed to those other areas of the revolution that might also contain local ordered worlds (as suggested in B4a).

The revolution made the separation off. Once again Anaxagoras reminds us that *Nous* is ultimately responsible for the cosmos: it begins the revolution that causes the separation off of ingredients from the original mix. This revolution produces the large masses of air and aether, the heavenly bodies, and the other contents of the world.

59 See Sider's comments on the traditional tripartite division (138).

The opposites separate off from one another. A consequence of the revolution is the separating off of the opposites from one another: the dense from the rare, the warm from the cold, the bright from the dark, and the dry from the moist. These are the same items that are enumerated in B15 and (with the exception of dense/rare) in B4b. These are not the only opposites, but they seem to be the ones that are most prevalent and efficacious in our cosmos. Even though the revolution causes their separation from each other, Anaxagoras will quickly remind us that this separation is only partial; there will never be complete separation off into volumes of pure and unmixed ingredients.

There are many shares of many things; only *Nous* is completely separated. The principle of the mixture of all things in all things is referred to obliquely by the claim that there are many shares (μοῖραι) of many things. This is a reference to B11, and the early part of B12, where we are told that there is a share of everything in everything. The other mention of shares, in B6, offers a proof that because there are just as many shares in the small as in the great, so everything is in everything. This point appears again here: none of the ingredients can be completely separated off from the original mix (ἀποκρίνεται), nor dissociated apart into a pure unmixed state from a later mixture (διακρίνεται). Saying that there is no separation 'one from the other' (ἕτερον ἀπὸ τοῦ ἑτέρου) reminds us of the original mixture, the principle of which is maintained through the everything-in-everything principle. The sentence ends simply: 'except *Nous* (πλὴν νοῦ)' stressing yet again that only *Nous* is completely pure and unmixed.

All *Nous* is alike, both the greater and the smaller. The purity of *Nous* guarantees that all of it is pure, unmixed, and alike, unlike other things, which always contain shares of everything else. The greater and smaller here may refer either to the *Nous* in larger or smaller living things, or perhaps to the larger or smaller strengths or concentrations of *Nous*: (great) cosmic *Nous* as opposed to (small) *nous* in living things.[60]

60 Sider says, 'The words "larger and smaller" ... make it clear that Anaxagoras is concerned with spatial uniformity,' adding that 'although ὅμοιος by itself does not = "homogeneous," the sentence as a whole makes this claim for *Nous*' (140). Sider's argument is that in the absence of a word such as Aristotle's coinages 'homoiomeries' and 'homoiomerous,' one can say that something is homogeneous only through 'the statement that any piece of any size is (exactly) like any other.' Parmenides B8.22 is an obvious counterexample: 'Nor is it divisible, since it is all alike (οὐδὲ διαιρετόν ἐστιν, ἐπεὶ πᾶν ἐστιν ὁμοῖον).' Sider notes the phrase in Parmenides, but implies that this is a special case, a use involving 'a boundless entity such as Parmenidean Existence, for which there can be no external comparandum' (ibid.). *Nous* would seem to be just such an entity, and it seems to me that Anaxagoras is here recalling Parmenides' use to make it clear that

Nothing else is all alike; characters in mixed objects are determined by varying concentrations or densities of ingredients. Having just said that all *Nous* is alike, Anaxagoras now contrasts it with the other things in the mix. None of them is unmixed, and so no example of a mixed thing is exactly like any other sample of a mixed thing.[61] Anaxagoras contrasts *Nous* and the ingredients in the mix: because everything partakes of a share of everything, no ingredient occurs, has occurred, or will occur in a separate, pure, unmixed state. The things that emerge from the mixture, either through separation off and the mingling of like with like, or from being mixed together from the separated ingredients, acquire their various characters from the predominance of certain ingredients. So, a lump of gold is a collection of ingredients in which gold has a higher density than other similar ingredients (such as flesh). Nevertheless, this lump of gold is not exactly like that lump of gold. A human being can be said to be made of flesh and blood because these occur in higher densities than other things (such as gold), but each lump of flesh may have different ratios of ingredients. What matters is that gold, or flesh and blood, predominate in each local mixture. I feel warm when there is more hot than cold in the mixture that I am, and I feel chilled as the hot is overcome by the addition of more cold. It is this claim at the end of B12 that supports the attribution to Anaxagoras of a so-called 'principle of predominance.'[62]

Nous is indeed homogeneous, unlike the mass of the other basic entities, the ingredients, which are always mixed together.

61 The text as given in DK reads ἕτερον δὲ οὐδέν ἐστιν ὅμοιον οὐδενί, 'nothing is like anything else.' Some scholars have suggested that this does not bring out the proper parallel with *Nous*, since not being like anything else does not entail a denial of homogeneity, and sits awkwardly between the claims that all *Nous* is alike and that a thing's characters are determined by the predominant ingredients. One suggested solution is to delete οὐδενί, with the resulting text then saying that 'nothing else is all alike.' This makes the contrast with *Nous* much clearer, and justifies the addition of the next claim, 'but each one is and was most manifestly those things of which there are the most in it,' by showing how the predominance of ingredients in a local mixture establishes characteristics. Nevertheless, Simplicius gives these lines three times (at *in Phys*. 157.3–4, 165.14–15, and 172.18–19), and includes οὐδενί in all three quotations. The suggestion appears in Wasserstein, and is accepted by Barnes (*Presocratic* 626 n. 22), Wright (*Presocratics* 131), and Waterfield (127). In correspondence, Schofield argued against changing the text. On his interpretation (see chap. 1 of his *Essay*), the point of the end of B12 is to assert that *all* of *Nous* is *all alike*, whether it is cosmic *nous* or *nous* in a living thing of no matter what physical size. This contrasts with everything else: every instance of something that is mostly gold differs from every other in some way. This is equivalent to the interpretation that I suggest here.

62 See Kerferd, Graham ('Postulates').

How should we conceive of Anaxagoras's *Nous*? The attribution to *Nous* of supreme control and comprehensive knowledge raises the question of whether Anaxagoras is concerned with a single, divine intelligence or mind, or with the nature of any mind, including human minds.[63] The statements about *Nous*' power, control, and knowledge of all things suggest that Anaxagoras's first concern in B12 is with a rational principle that pervades the universe and could be identified with a supreme mind that arranges the processes of the natural world. This *Nous* is not a creator, for the ingredients are themselves metaphysically basic and neither come to be nor pass away, and the processes of separation off and recombination are produced by the combination of the whirling motion and the natures of the ingredients. Yet, as the intelligent instigator of the revolution, cosmic *Nous* can well be said to control the development of the cosmos.[64] The superlative degree of awareness and intelligence that Anaxagoras attributes to this *Nous* suggests that he is not here thinking of *nous* in us. We possess neither all knowledge nor all control. Nevertheless, because *Nous* is in the things that have soul, and because Anaxagoras says that *Nous* is all alike (at the end of B12), we must assume that human minds and intelligence are similar to the *Nous* that drives the cosmos.[65] As noted above, I take the 'all alike' claim to apply to the separateness and pure nature of *Nous*, without a commitment to the claim that *nous* is exactly the same in the content of its knowledge or the extent of its activity in every being that has it. Thus, Anaxagoras can allow for the differences between *nous* in human beings and other living things, and differences in intelligence and understanding among humans.[66] I do not think that this is a difference that

63 For a discussion of the issue, see Schofield 3–22. See also the note on B11, above.

64 On the claim that *Nous* is not a creator, see Louguet. Simplicius stresses the role of *Nous* as cause, even though its causality is indirect, in the context to B13 (*in Phys.* 300.27ff.).

65 Aristotle suggests that Anaxagoras reached his conclusions about cosmic *Nous* from an argument by analogy with the role of *nous* in living things (*Met.* 1.3 984b15ff.; A58).

66 A101a of the Testimonia might be read as suggesting that even in us *Nous* could have supreme knowledge and control, if only we would use it properly: 'Anaxagoras does not assign *nous* in the sense of practical wisdom to all human beings; not because they do not have *nous* in them, but because they do not always use it' (Psellus). I suspect that Anaxagoras was concerned with the question of what differentiates minds and degrees of awareness in different species of living things, or between different individuals in the same species. See the reasonable conclusions on this reached by Schofield 20–22. Menn claims that 'once we see that *nous* means not mind but rationality, the total body of rationality of which we each possess a portion (although this portion is not our "mind")' there is no problem about the differences between *nous* in the cosmic sense and *nous* in

should be attributed to the *amount* of *Nous* in something. If one person understands more than another one because of the amount of *Nous* she has, then would not one understand even more by increasing the supply of *nous* that one has? One might think that learning is analogous to growth; yet there are difficulties with this account. I become larger by adding flesh and blood to my body through nutrition, wiser by having *nous* added . . . to what? And through what process? Could I make a dog as rational as a human being by increasing its amount of *nous*?

B13 Once *Nous* begins the rotation, separation off and the breaking up of the mass of ingredients proceeds

When Nous began to move [things], there was separation off from the multitude that was being moved, and whatever Nous moved, all this was dissociated; and as things were being moved and dissociated, the revolution made them dissociate even more.

***Nous* began to move things.** This passage, together with B12, suggests that the mass of ingredients was motionless before *Nous* initiated the rotation. This is supported by Simplicius at *in Phys*. 1123.21 (A45), who says that all the things that are were at rest for an unlimited period of time before 'cosmos-making' *Nous* put motion into them.

Separation off and dissociation occur in whatever *Nous* moves. In B17 Anaxagoras says that the dissociation (διακρίνεσθαι) of a mixed item is what ordinary people call 'passing-away,' and the use here suggests that the speed and force of the rotation (see B9) cause the dissociation of the mass of ingredients. Once that mass has been broken, separation off of ingredients begins, and clumps of like ingredients begin to form.[67]

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us (Menn 73, n. 7). I am not sure that this solves the distribution problem, especially if, as Menn asserts, *nous* is corporeal.

67 Some scholars, including Diels and Guthrie, reject the impersonal construction and translation of ἀπεκρίνετο as given here, and take *Nous* as the subject. Guthrie translates: 'After Mind initiated motion, it began to withdraw from all that was moved, and all that Mind moved was divided' (2:274). Guthrie, following Heidel, says that this is confirmed by B12, but it seems to me that it is inconsistent with both B12 and B14. B12 indeed says that *Nous* is unlike the other things, which all have a share of each other, but that does not imply that *Nous* withdraws from the cosmos (after all, B11 asserts that *Nous* is in some things). Sider argues that, 'first, *Nous* never was part of anything else, and so could not have separated from that which it had the power to move. Second, the impersonal, particularly of *krinō*-words is altogether regular in Anaxagoras; look no further than line 5 of this fragment' (143). Finally, B14 confirms the ever-present status of *Nous* in the cosmos.

The processes continue. As the revolution imparted by *Nous* continues, more and more of the mass is dissociated and more separation occurs. B12 has described the expansion of the rotation, and that expansion takes it further out into the unlimited mass of ingredients. In addition, the already separated off ingredients continue to be dissociated; every separation produces a new mixture (which is then later dissociated again). This is the 'even more' to which the fragment refers. *Nous* is ultimately responsible for all of this (as Simplicius makes clear in his argument against Alexander in the context for the fragment at *in Phys.* 300.27ff.). We should remember that all things always partake in all things. No pure stretches of an ingredient will ever be completely separated off, nor will the process of breaking up of the original mass ever come to an end; the surrounding mass of 'all things together' is unlimited.

B14 The continued presence and force of *Nous* in the cosmos

Nous, which always is, most assuredly is even now where all the other things also are, in the surrounding multitude, and in the things that were joined together and in the things that have been separated off.

There is a difficult problem with the text of this fragment. The manuscripts of Simplicius read: ὅσα ἐστί τε κάρτα (with one manuscript reading ἔσται). In DK, Diels prints ὃς ἀεί ἐστι, τὸ κάρτα, and that is the text that I use here.[68]

68 Diels's emendation makes the least alteration to the text. For other suggestions and discussion, see Sider, 'Fr. 14.' In his edition, Sider writes: ὅσα ἐστί τ᾽ ἐκράτησε ('*Nous* came to control all that is'; Sider's translation). Sider defends the change by appealing to the context in Simplicius, who says that what he quotes supports a double world-order (the noetic and the sensible). Sider argues that there is nothing in the second (secure) half of the fragment to give Simplicius that idea, and suggests that some form of the verb κρατέω, corrupted to κάρτα, would lead Simplicius to the idea that the sensible world depends on the intelligible, as he says in the line leading into the quotation (Sider 145–46). This is certainly possible, but it is unsafe to build a conjecture on the foundation of Simplicius's (clearly incorrect) interpretation of Anaxagoras. This is also true of Marcovich's proposal that we read ὁ δὲ νοῦς, ὅς ἀ<εὶ ἦν καὶ> ἔσται, τὸ κάρτα καὶ νῦν ἐστιν κτλ. ('*Nous*, which always was and will be, most assuredly is now etc.'), which he bases on Simplicius' understanding of the text (Marcovich 240). (See also Sider's comment on p. 145 of *Fragments*.) Huffman comments that 'the passage is so confused that confidence is not possible' (review of Sider 69). If we simply left the manuscript reading alone, the passage would read 'both insofar as *Nous* assuredly is and is now also where all the other things are . . . ' Thanks to David Sedley and Carl Huffman for help and suggestions here.

***Nous* always is (ἀεί ἐστι).** It might seem odd to stress that *Nous* always is, as none of the ingredients of the original mixture are either generated or destroyed; thus there appears to be no real contrast here.[69] But although the ingredients are not subject to coming-to-be and passing-away, the natural artefacts produced by the mixture of the ingredients are not genuinely real, and so are not permanent.

***Nous* is even now where all the other things also are.** Although *Nous* originates the revolution that brings about the formation of the cosmos, one might doubt that it is still causally efficacious, insofar as Anaxagoras has said that the force and speed of the revolutions cause the breaking up of the mass and the formation of the large bodies (see B9 and B13). Although everything partakes of a share of everything, and so every ingredient is present in some density at every point of the cosmos, Anaxagoras has claimed that *Nous* is not a part of the universe in the same way as the ingredients, because it is not mixed with anything (B11, B12). He here reminds us that, nevertheless, *Nous* is present throughout the cosmos, which therefore remains ordered and intelligible.[70]

In the surrounding multitude, and in the things that were joined together, and in the things that have been separated off. These phrases cover the three states in which the ingredients occur. The surrounding multitude (the same phrase is used of the surrounding multitude or 'muchness' of B2) is either the undifferentiated mass of ingredients before the rotation begins or, more likely, that undifferentiated mass not yet reached by the expanding revolution. The things that have been separated off are the ingredients that emerge from the dissociation of the surrounding mass (see B13). The things being joined together (*τὰ προσκριθέντα*) are the natural artefacts that formed by the mixture or compounding (hence, joining together) of ingredients that have been separated off from the surrounding mass (see B4a and B17). The separation off from the surrounding mass precedes the joining of these ingredients into the temporary natural artefacts that are living things and the other features of our world. *Προσκρίνεσθαι* is possibly Anaxagoras's coinage, and with its image of bringing together separated things is an ideal word to use for things that result from the joining together of ingredients that have been separated off (see also Sider 146–47).

69 This is one of the reasons Sider gives for rejecting the Diels emendation here (see preceding footnote).

70 One could also regard Anaxagoras as trying to convey the presence of *Nous* as an immaterial thing among the material ingredients of the universe.

B15 The consequences of the rotation: the formation of the earth and the heavens

The dense and the wet and the cold and the dark came together here, where <the> earth is now; but the rare and the hot and the dry <and the bright> moved out to the far reaches of the aether.

The dense ... **the dark;** ... **the rare** ... **<the bright>.** This fragment explains the structure of the cosmos within the whirl, and explains the movements of various stuffs once they have begun to separate off as a result of the rotation. The list of opposites matches B12 in including the dense and the rare (see B4b where they are absent). This suggests that neither list is intended to be exhaustive. Sider adds *καὶ τὸ λαμπρόν* for the sake of symmetry, and there is no reason not to do so. B15 has been used as evidence for attributing to Anaxagoras an austere ontology that limits the basic ingredients in the original mixture to the opposites, but although only opposites are mentioned here, we need not think that only the opposites were in the original state of 'all things together' (see Essay 2). The passage can be interpreted as saying that anything that is predominantly cold, wet, dense, dark, etc., can be found together (iron ore in our Earth, for instance).
Came together here ... **moved out.** As might be expected, the denser stuffs (things that are dense, wet, cold, dark) are moved into the centre by the force of the rotation, while the lighter and brighter stuffs move out. The Anaxagorean stuffs behave the same way as grains and chaff in a winnowing basket, or, more precisely, in the centrifugal motion caused by whirling a ladle or bucket (see Tigner 'Ladle'). This is a case where present phenomena can give a hint of the great unseen cosmic processes (see B21a).
Where the earth is now. In DK, Diels had printed *<ἡ γῆ>*, with a note that this was an addition in the Aldine edition of Simplicius (published in 1526). Sider discovered by an examination of manuscripts that *γῆ* is present in all of them.[71] As noted above, the Earth on which we live is composed of ingredients that are primarily dense, dark, wet, and cold. This would include earth as a stuff, and we need not suppose that earth itself, and even our Earth, are composed simply of a collection of these opposites. In the first place, Anaxagoras is here telling us why the Earth is where

71 Sider conjectures that 'at one point *<ἡ> γῆ* was written as *<ἡ γῆ>* and never corrected.' As Sider points out, the mistake engendered a 'ghost problem'; the merits of *γῆ* were debated in a number of articles. (Full discussions can be found in Sider 'Confirmation' and *Fragments* 149.)

it is. Not all earthy stuff is on the Earth (see A35, A42.10, and A77 on the character of the moon, etc.), and the Earth itself could be thought of as an artefact composed of ingredients (including earth, water, salts, ores). Second, B15 gives us a general principle about the behaviour of ingredients in the whirl: once the mass begins to move, and ingredients begin to separate off, they will be affected in different ways by the rotation, depending on their degrees of density or rarity, heat or cold, and so on.

B16 Patterns of change in meteorological phenomena

From these, as they are being separated off, earth is compacted; for water is separated off from the clouds, and earth from the water, and from the earth stones are compacted by the cold, and these stones move farther out than the water.

Because of the similarity of the process described here to the theory of Anaximenes, B16 has been taken to be cosmogonical, and concerned with the initial formation of clouds, sea, earth, and stones as the rotation begins and continues. Stokes argues instead that in this fragment Anaxagoras is discussing processes that take place now, and this is probably correct; nevertheless, these will certainly be like those that brought about the present states of the revolution and the cosmos.[72] Barnes follows Stokes's meteorological view and interprets the fragment as belonging to the Ionian tradition of seeing contemporary processes as evidence for the emergence of the various large masses from one another.[73]

From these (ἀπὸ τουτέων) as they are being separated off earth is compacted. The referent for the pronoun is unclear. Several commentators take the referent to be the opposites.[74] This part of B16 appears only at *in Phys*. 179.9–10; it follows a quotation of B15, and between the two Simplicius remarks, 'he says that these originating forms and most simple things are separated off, and that other things, more compounded than these, sometimes are compacted like compounds, and sometimes separated off like the earth. For he says the following,' and then he quotes B16. It looks as though Simplicius is using the fragment as support for his claim that some phenomenal things are separated off of the original mass, while others are compacted or mixed (see B17) from them. Later in the fragment

72 Stokes 'On Anaxagoras, Part II'; see also Schofield's comment at KRS 372 n. 1.

73 Barnes *Presocratic* 332. Cf. the 'turnings of fire' in Heraclitus B31a, which might be an example of how roads up and down are the same (Heraclitus B60).

74 See, for instance, Schofield and Wright (*Presocratics* 133), and perhaps Simplicius. Sider (152) takes the referent to be 'clouds.'

Anaxagoras says that earth is separated off from water, and this seems inconsistent with the opening line, especially if we take it to be a reference to B15.

Water is separated off from the clouds, and earth from the water. Clouds are probably compacted air, and water certainly separates off from clouds in the form of rain. That earth can be separated off from water is clear from evaporation. There is most certainly influence from Anaximenes here, but it has been filtered by Anaxagoras's knowledge of Parmenides' arguments.

Stones are compacted from earth by the cold. Stones are formed when earth is chilled. Here Anaxagoras gives us a process (compacting) and an efficient cause (cold).

These move farther out than the water. Another rather mysterious claim. There is evidence that Anaxagoras thought that the whirling motion imparted by the revolution could snatch up stones and ignite them (see A71 and Essay 5). This is apparently not a process that is limited to the formation of the earth and the heavens, but operates continuously and everywhere.

B17 The Eleatic principle of no coming-to-be and no passing-away; explanation of phenomena

The Greeks do not think correctly about coming-to-be and passing-away; for no thing comes to be or passes away, but is mixed together and dissociated from the things that are. And thus they would be correct to call coming-to-be mixing-together and passing-away dissociating.

The Greeks do not think correctly about coming-to-be and passing-away. 'The Greeks' is a way of referring to ordinary people who suppose that generation and destruction are genuine processes. They are thus equivalent to the mortals of Parmenides' poem, who think 'that to be and not to be are the same and not the same' (B28.6) or that 'coming-to-be' and 'passing-away' name real processes (cf. 28B8.38–41). See also Empedocles B11, where he calls fools those 'who expect that what was not before comes to be or that something dies and is in every way destroyed.'

No thing comes to be or passes away. Anaxagoras's main point is that there is no such thing as genuine coming-to-be and passing-away. Insofar as phenomenal objects, like dogs, trees, and people, are generated and destroyed, they are not real. They are merely temporary emergences from the background mass of ingredients, and are thus natural artefacts and do not figure in the correct account of what is genuinely real in the world. At the deepest level of reality there can be no generation or destruction.

The genuinely real things are the ingredients in the original mixture (and *Nous*). These are metaphysically and epistemologically basic, satisfying the Eleatic requirements for what is.

Mixture and dissociation (συμμίσγεταί τε καὶ διακρίνεται) from the things that are. It is crucial to see that there are two processes discussed here.[75] These take place at the level of phenomenal objects and are different from the separating off (*ἀποκρίνεσθαι*) that occurs when the mass of original ingredients is set in motion (see note on B2). Mixing occurs when separated off ingredients combine to form a natural artefact; when that natural artefact (such as this dog or that tree) falls apart, it is dissociated and the ingredients can be re-mixed. Because Anaxagoras's universe is a plenum, every separation off will result in a rearrangement, even if what emerges is simply a mass of ingredients in which one or another ingredient predominates, as in iron ore (see B12). The same is true of every dissociation, even if the result of the separation is a mixture of ash or earth produced by burning or decomposition. Thus, the Parmenidean strictures against coming-to-be and passing-away are satisfied, while at the same time Anaxagoras can account for the phenomena of the world as reported by the senses. See also Empedocles B8, where Empedocles makes the same point about the unreality of generation and destruction: '. . . there is only mixing and interchanging of what is mixed.'

They would be right to call coming-to-be mixing-together and passing-away dissociation. Anaxagoras aims to correct the thought and usage of ordinary people. Unlike Empedocles (31 B9), he does not himself assent to the customary use of the terminology of coming-to-be and passing-away and seeks to correct those who think and speak that way.

B18 The light of the moon

The sun places the light in the moon.

Like other early Greek philosophers, Anaxagoras apparently provided full accounts of physical phenomena, including astronomy, meteorology, geology, and so on. Little of this has survived, although the reports in the testimonia give us some idea of the broad range of Anaxagoras's views. In saying that the moon gets its light from the sun, Anaxagoras is apparently

75 A number of scholars, missing the role of mixture in Anaxagoras's theory, have underestimated the importance of B17. See Essay 2.

following Parmenides (B14 and 15).[76] Here Anaxagoras says that the sun actually puts brightness into the moon, using τὸ λαμπρόν, the same word that appears in his lists of the opposites. Because everything is in everything, there will already be some bright (and dark and wet and earth and bone, etc.) in the ingredients that make up moon, but apparently dark predominates. The sun passes on some of its brightness to the moon.[77]

B19 The rainbow

We call the reflection of the sun in the clouds a rainbow.

The extent of the fragment is disputed. Most scholars now limit the fragment to the passage given here, following Solmsen, who argued that the discussion of the rain (that follows these words) comes from the scholiast who is the source of the fragment, and not from Anaxagoras.[78]

Reflection of the sun in the clouds. A literal translation of the Greek would be 'the shining in the clouds opposite the sun.'[79]

Rainbow. Iris was the messenger of the gods. Like Xenophanes, who insisted that the rainbow was in reality coloured clouds (B32), Anaxagoras gives a naturalistic explanation of the phenomenon.

B20

The passage given by Diels as B20 is part of a Hebrew translation of an Arabic translation of Galen's commentary on Hippocrates. There are references to astronomical views held by two people. Moses Alatino, a Renaissance translator took one of the names to be that of Anaxagoras, but, as Sider says, 'an unbeatable team of a Hebraist, an astronomer, and a classicist has determined that both names are transliterations' of Ἡσίοδος [Hesiod].[80] The passage is now identified as Hesiod fragment 394.

B21 The limits of sense experience

Owing to their [viz., the senses'] feebleness, we are not able to determine the truth.

This is one of two fragments preserved by Sextus Empiricus, both concerned with perception and knowledge. In the context of this fragment,

76 See Graham 'Lumière' and Graham and Hintz 'Eclipse' for discussion.

77 For a discussion of the authenticity of the fragment, see Sider 158–59.

78 See Solmsen and Sider 160–61.

79 See Sider 161, for discussion of both the translation and what Anaxagoras's explanation might have been.

80 Sider 162.

Sextus says that the early physicists (that is, the Presocratic philosophers) first introduced inquiry or reasoning as the criterion of truth. Having condemned the senses as unreliable, they relied on reason (*logos*) as the judge (*kritēs*) of truth. Sextus then cites Anaxagoras as an example, quoting B21, and reporting that Anaxagoras offered the inability of the senses to mark gradual colour changes as proof of their unreliability. B21 shows that there is a limit to what we can know through the senses, but there is no indication that Anaxagoras rejected the senses as completely unreliable. For further discussion, see Essay 5.

Feebleness (ἀφαυρότης). The senses are weak or feeble in the sense of being unable to make the fine discriminations necessary to judge small or incremental changes. The view here is similar to that expressed in Democritus B11 (also quoted by Sextus). The noun form *ἀφαυρότης* occurs only here.

To determine the truth. The verb here is *κρίνειν*: to judge or determine, with a root meaning of *to separate*. As we have seen, the compound *krinō* verbs (*ἀποκρίνεσθαι*, *προσκρίνεσθαι*, *διακρίνεσθαι*) play fundamental roles in Anaxagoras's cosmology. Here, the senses cannot distinguish finely enough to note the gradual stages of a change that occurs as a dark colour is added drop by drop to a light one (or vice versa). So, they cannot determine the truth (that the change is indeed incremental) but instead simply note that a major change of colour has occurred.

B21a Perception as a sign of the truth

. . . appearances are a sight of the unseen.

Like B21, this fragment is quoted by Sextus, in the midst of a discussion of Democritus. Some have suggested that it really comes from Democritus not Anaxagoras, or that it is a proverbial phrase.[81]

Appearances (τὰ φαινόμενα). These are the contents of experience: things that are gained through sense perception (through all forms of perception, not only through sight), not things that merely seem to be the case.

Sight (ὄψις) of the unseen (τῶν ἀδήλων). A glimpse or sighting of what is not manifest, with a hint of paradox. Anaxagoras claims that processes in the sensible world provide a clue to what occurs at the level of what is real, unavailable to perception, but graspable by understanding. Thus, the motions of the heavens provide a glimpse of the great revolution that formed the cosmos, everyday facts of growth and nutrition can be a clue to the

81 See Sider 165–66; Barnes *Presocratic* 538 and 644 n. 5. See also Essay 5.

principle of 'everything in everything,' the workings of our understanding hint at the nature of *Nous*, and so on.

B21b

Sider argues that this 'fragment,' attributed to Anaxagoras by Plutarch, 'should be downgraded' to a testimonium.[82] I see no reason not to accept Sider's judgment, and have placed the passage in the Testimonia at A102.[83]

B22 Egg whites

. . . egg whites are bird's milk.

Sider advocates downgrading B22 to testimony, suggesting that 'Anaxagoras' is incorrect for 'Alcmaeon,' and citing Aristotle *Generation of Animals* 752b22 (who says that the view that the egg white is nourishment is what 'people think and Alcmaeon of Croton says').[84] Nevertheless, this is an important Anaxagorean point about seeds, and I accept the fragment as authentic. The text as given here is that suggested by Brennan, who argues that 'what is called (*τὸ καλούμενον*)' in the text of Athenaeus is 'a misplaced gloss' in the received text.[85] Brennan argues that 'the phrase "what is called" makes it syntactically impossible to construe "the white of the egg" as the subject term of the predication,' and notes that Eustathius refers to Anaxagoras's view, and also seems to have seen a text of Athenaeus that did not contain *τὸ καλούμενον*.[86] If we read the text as suggested here, Anaxagoras's point about egg whites is parallel to B19's explanation of the rainbow, and adds to what we know about Anaxagoras's view of the role of seeds in the development of an organism (particularly if we think of seeds as biological rather than small collections of opposites; see Essays 2 and 3).

82 Sider 168; see also Jöhrens 65.

83 See also Guthrie 2:316 n. 3: the passage 'given by DK as fr. 21b can hardly be said to add anything to Anaxagoras' opinions about human superiority to the beasts in mental faculties, owing to the difficulty of deciding how much is to be referred to Anaxagoras.'

84 Sider 169–70. Sider also argues that 'even if Athenaeus [our source] is not incorrect to name Anaxagoras in this context . . . this fragment should still be placed with the A-testimony, as, poetry excepted, Athenaeus generally does not quote presocratics.'

85 Brennan 537. In the second edition of *Fragments*, Sider argues that the suggested bracketing is unnecessary.

86 Brennan 536.

TESTIMONIA

LIFE

A1

Diogenes Laertius, *Lives of the Philosophers* 2.6–15: (6) Anaxagoras, son of Hegesibulus or Eubulus, was from Clazomenae. He was a pupil of Anaximenes, and he was the first to set mind over matter. His book, which is expressed in a pleasant and high-minded style, begins this way: 'All things were together, and then, when Mind (*Nous*) came, it set them in order.' Because of this, Anaxagoras was nicknamed 'Mind,' and Timon, in his *Satires*, says about him:

> They say, I suppose, that Anaxagoras, a valiant hero,
> is 'Mind,' because his was the mind that suddenly woke up
> and bound together all things that were confused before.

He was notable for his noble birth and for his wealth, and even more for his magnanimity, because he gave away his inheritance to his kin. (7) When they took him to task for neglecting his estate, he said, 'Why then, don't you take care of it?' In the end, he retired and studied nature, giving no thought to public affairs. When someone asked him, 'Have you no care for your country?' he replied, 'Hush, I am very concerned about my country,' and he pointed to the heavens.

Anaxagoras is said to have been twenty years old at the time of Xerxes' invasion, and to have lived for seventy-two years. Apollodorus says in his *Chronicles* that Anaxagoras was born in the seventieth Olympiad and died in the first year of the eighty-eighth. According to Demetrius of Phaleron

in his *List of Archons*, Anaxagoras began to philosophize in Athens during the archonship of Callias [456 BC], when he was twenty.[1] They say that he spent thirty years there.

(8) Anaxagoras held that the sun is a fiery mass of red-hot metal and is larger than the Peloponnese (although some attribute this view to Tantalus), and that the moon has dwelling places, and also hills and ravines. He maintained that homogeneous stuffs are the first principles, for just as gold is composed of what is called gold dust, so the whole universe results from the compounding of small homogeneous bodies. *Nous* is the first principle of motion; heavy bodies, such as earth, occupied the lower region; light ones, such as fire, the higher. Water and air occupied the middle. So, the sea remained on the surface of the earth, which is flat, as the moisture was evaporated by the sun.

(9) In the beginning the stars were carried around as though in a dome, so that the celestial pole which is always visible was directly over the earth, but later the axis became inclined. The Milky Way is the reflection of the light of those stars that are not illuminated by the sun. Comets are a conglomeration of planets that throw out flames, and shooting stars are like sparks hurled out by the air. Winds arise from air rarefied by the sun. Thunder is the clashing of clouds; lightning, the friction of clouds; an earthquake the sinking of air into the earth. Animals first came to be from moist, hot, and earthy stuffs, but later from one another; and males come from the right side and females from the left side [of the uterus].

(10) They say that he predicted the fall of the stone that occurred at Aegospotami; he said it would fall from the sun. That is why Euripides, who was his pupil, said in the *Phaethon* that the sun is a golden clod. Furthermore, when he went to Olympia he sat down in a leather cloak as though it were about to rain; and the rain began. When someone asked him if the mountains of Lampsacus will ever become sea, he reportedly answered, 'If time does not give out.' Once, when he was asked for what purpose he had been born, he said, 'for the study of the sun and the moon and the heavens.' To someone who said, 'You were deprived of the company of the Athenians,' he said, 'Not at all, but they of mine.' After seeing the tomb of Mausolus he said, 'an extravagant tomb is an image of wealth turned to stone.' (11) To a man who was grieving because he was dying in a foreign land, Anaxagoras said, 'No matter where you start, the descent to Hades is the same.'

According to Favorinus in his *Miscellaneous Histories*, Anaxagoras is thought to have been the first to declare that Homer's poetry is about

1 There is a problem with the name of the archon in the text; I here follow DK. See the discussion of Anaxagoras's life in Essay 1.

virtue and justice; this view was taken further by his friend Metrodorus of Lampsacus, who was the first to study the physical doctrines of the poet. Anaxagoras was the first to publish a book with diagrams. Silenus reports in the first book of his *Histories* that the stone fell from the heavens during the archonship of Demulus; (12) and, according to him, Anaxagoras said that the whole of the firmament was made of stones; they are held together by a powerful rotation and they fall when it slackens.

Different things are reported about his trial. In his *Succession of the Philosophers*, Sotion claims that Anaxagoras was brought to trial by Cleon for impiety because he held that the sun was a fiery mass of red-hot metal. Although he was defended by his pupil Pericles, he was fined five talents and exiled. But Satyrus says in his *Lives* that the suit was brought by Thucydides, a political opponent of Pericles, and that the charge was not only impiety but also Medism [Persian sympathies]; he was condemned to death *in absentia*. (13) When news was announced to him of his conviction and of the deaths of his children, he said about the conviction, 'Nature condemned both them and me to death a long time ago;' and about his children, 'I knew they were mortal when I begat them.' (Some attribute this to Solon, and others to Xenophon.) But Demetrius of Phaleron says in his *On Old Age* that Anaxagoras buried his children with his own hands. According to Hermippus in his *Lives* Anaxagoras was held in prison awaiting execution. When Pericles arrived, he asked if the accusers were able to bring any charges against *him* for his own way of life. They said nothing, and Pericles said, 'And yet I am his pupil; so don't kill the man because you were provoked by slanders; if you are persuaded by me, free him.' Anaxagoras in fact was released; but, unable to bear the insult, he killed himself. (14) In the second book of his *Miscellanies*, Hieronymous says that Pericles brought Anaxagoras to the court wasted and thin from disease, so that he was freed more from pity than from judgment. So much for the reports of his trial.

It seemed that he was somehow hostile to Democritus when he was unable to converse with him. Eventually he retired to Lampsacus and died there. When the archons of the city asked him what he wished to have done for him he said, 'Grant the children a holiday each year in the month of my death.' This custom is observed even now. (15) When he died, the Lampsacians buried him with honours and gave him this epitaph:

Anaxagoras, who reached the furthest limit of truth
about the heavenly cosmos, lies here.

I myself have written about him:

He once declared that the sun is a burning mass of red-hot metal;
for this Anaxagoras was destined to die;
yet while his friend Pericles rescued him,
he departed life because of the weakness of his wisdom.

There were three other people called Anaxagoras.[2] One of them was a rhetorician in the school of Isocrates, the second a sculptor whom Antigonus has mentioned, the last a grammarian of the school of Zenodotus.

A2

Harpocration *Lexicon*. Anaxagoras: Anaxagoras the sophist, son of Hegesibulus, was from Clazomenae, and was a pupil of Anaximenes of Miletus. He was nicknamed Mind, because he said that matter and mind are the guardians of all things. It is he who said that the sun is a fiery mass of red-hot metal.

A3

***Suda* A 1981.** Anaxagoras: Anaxagoras the sophist, son of Hegesibulus of Clazomenae, pupil of Anaximenes of Miletus. He was called Mind, because he said that matter and mind are the guardians of all things. It is he who said that the sun is a fiery mass of red-hot metal, that is, a fiery stone. Despite the fact that Pericles defended him, he fled Athens. After arriving at Lampsacus, he ended his life there by starving himself. He departed his life at the age of seventy years, because he was imprisoned by the Athenians for introducing a certain new belief about god.

A4

Cyril of Alexandria *Against Julian* 1.12 B: He says that the natural philosophers Democritus and Anaxagoras were born in the seventieth Olympiad, and also Heraclitus, nicknamed 'the Obscure.'
Eusebius *Chronicles*: 1557 years after Abraham, Anaxagoras dies [DK: Ol. 80, 1: 460].

A4a

Inscription on the Parian Marble; Ep. 60 (*Fragments of the Greek Historians* 239A60, II, 1000, 22): 179 years ago Euripides was 44 years

2 Omitting the parenthesis here, as do most recent editions of Diogenes Laertius.

old and first won the competition for tragedy, the archonship of Diphilos in Athens [442/1]; Socrates and Anaxagoras were contemporaries of Euripides.

A5

Diogenes Laertius ***Lives of the Philosophers*** **9.41**: Regarding dates, as Democritus himself says in the *Lesser World-Order*, he was young in the old age of Anaxagoras, being forty years younger than Anaxagoras. Democritus says that the *Lesser World-Order* was composed seven hundred and thirty years after the fall of Troy.
9.34: [Democritus] studied with Leucippus and Anaxagoras, being, according to some, forty years younger than [Anaxagoras]. Favorinus says in his *Miscellaneous Histories* that Democritus claimed that Anaxagoras's doctrines concerning the sun and the moon were not his own but ancient, and that he plagiarized them. **9.35**: Democritus also disparaged Anaxagoras's views about cosmogony and on mind, having a grudge against him because Anaxagoras had not accepted him [as a student]. How then can Democritus have been his pupil, as some say?

A6

Philostratus ***Life of Apollonius*** **2.5** (Kayser 46.22): I hear, Apollonius, that Anaxagoras of Clazomenae observed celestial phenomena from Mount Mimas in Ionia, and Thales of Miletus from nearby Mycale . . .
1.2 (Kayser 3.6): Who does not know that in Olympia, during the dry season, Anaxagoras came into the stadium in a sheepskin in order to predict showers? That, when he foretold that a house would collapse, he did not lie, for it did fall? That when he predicted that night would come in the daytime, and that stones would fall out of the sky at Aegospotami, he spoke the truth?

A7

Strabo *Geography* **14** p. 645: There was an illustrious man from Clazomenae, Anaxagoras the physicist, a disciple of Anaximenes of Miletus; Archelaus the physicist and Euripides the poet learned from him.
Eusebius *Preparation for the Gospel* **10.14, 13**: Archelaus came next as head of the school of Anaxagoras in Lampsacus.
Clement *Miscellanies* **1.63**: After Anaximenes, came Anaxagoras, son of Hegesibulus of Clazomenae; he took Anaximenes' teaching from Ionia to Athens. Archelaus, from whom Socrates learned, succeeded him.

[Galen] ***History of Philosophy* 3**: Anaximander prepared Anaximenes to become the teacher of Anaxagoras, who abandoned Miletus and went to Athens and inspired Archelaus, the first Athenian to become a philosopher.

A8

Simplicius ***Commentary on Aristotle's Physics* 25.19**: Empedocles of Acragas was born not much later than Anaxagoras.

A9

Proclus ***Commentary on Euclid* 65.21**: After [Pythagoras], Anaxagoras of Clazomenae and Oinopides of Chios (who was slightly younger than Anaxagoras) studied many things having to do with geometry.

A10

Cedrenus ***History* 1.165**: And indeed, as the Greek historians report, Pherecydes of Syros, and Pythagoras of Samos, and Anaxagoras of Clazomenae, and Plato of Athens journeyed out to [the Egyptians] hoping to learn a more precise theology and natural philosophy from them.

Ammianus Marcellinus ***History* 22.26.22**: . . . On the basis of [secret Egyptian writings] Anaxagoras predicted that rocks would fall from the sky and, after handling the mud from a well, he predicted that there would be earthquakes.

A11

Inscription on the Parian Marble ep.57 (FGr.Hist. 239A57 ii.1000): During the archonship of Theagenides in Athens, 205 years ago: the stone fell in Aegospotami and Simonides the poet died, aged 90.

Pliny ***Natural History* 2.149**: The Greeks sing the praises of Anaxagoras of Clazomenae for predicting (in the second year of the seventy-eighth Olympiad) the period within which a boulder would fall from the sun, because of his knowledge of writings on the heavens. It happened during the day in the part of Thrace near the Goat River [Aegospotami] – even now this rock is on display because it is the size of a cart and is burnt in colour – and during those same nights a comet was also burning. If one believes that the prediction occurred, one must admit at the same time that Anaxagoras's prophetic power was even more miraculous, and also that our understanding of the nature of things must be abandoned and that all things are confused – if one accepts either that the sun is itself

a stone or that there ever was a stone in it. Nevertheless, it will not be questioned that stones frequently fall [from the sky]. Even today a stone is worshipped in the gymnasium in Abydos for this very reason (indeed it is of moderate size), but the same Anaxagoras is said to have predicted that it would fall in the middle of the region.

Eusebius *Chronicles*: A stone falls into the Goat River [Aegospotami] from the sky 1551 years after Abraham.

A12

Plutarch *Life of Lysander* 12: Some also say that the fall of the stone was a portent of this calamity;[3] for, as many believe, an enormous stone fell from the heavens into Aegospotami. It is displayed even now by the people who live in the Chersonnese, who venerate it. It is said that Anaxagoras predicted that if some slipping or shaking occurred among the bodies that are held fast in the heavens, there would be an expulsion and a fall after one of the bodies has been broken off. He said that none of the stars is in its natural place, and, as they are made of stone and heavy, they shine because of the resistance and whirling of the aether. They are dragged along by force, bound together by the whirl and the tension of the circular motion. In this way, presumably, they were kept from falling here at the outset when the cold and the heavy things were separated off from the whole . . . Daimachus testifies for Anaxagoras in his *Histories of Piety*, reporting that an enormous flaming body, just like a fiery cloud, was seen in the heavens for seventy-five days continuously before the stone fell. It did not stay in one place, but was moved along in complex and irregular paths, so that fiery fragments, torn away by its plunging and wandering path were carried in all directions and flashed like lightning, just like shooting stars.

A13

Plutarch *Life of Pericles* 16: The man who maintained all this frugality for Pericles was a single house slave, Evangelos; he was unsurpassed in household economy, either because he was good at it by nature, or through being trained by Pericles. Indeed, these reports are opposed to the wisdom of Anaxagoras, if Anaxagoras really abandoned his house and left his land fallow to be grazed by sheep because of his zeal and high-mindedness. But,

3 The Athenian fleet was defeated by Lysander at the Battle of Aegospotami in December, 405 BC.

I think, the life of a speculative philosopher is not the same as that of a politician.

Plato *Hippias Major* 283a4–6: [They say that] although a rich estate was left to him, Anaxagoras paid no care and it was lost to him. Thus he practised wisdom mindlessly.

A14

Tertullian *Apology* 46: But if I were to make a comparison [between Christians and pagans] on the basis of trust: Anaxagoras refused to return a deposit to his guests; but Christians are called trustworthy even by strangers.

A15

Plato *Phaedrus* 269e: It is very likely, my friend, that Pericles became the most complete rhetorician of all. – Why? – Because all the great arts require glibness and lofty talk about nature. This, it appears, is the source of their high-mindedness and their effectiveness in all respects. In addition to his natural ability, Pericles acquired this skill; for, I suppose, he happened upon just such a one in Anaxagoras, and was filled with lofty talk and understood the nature of mind and mindlessness, concerning which Anaxagoras had very much to say; from this Pericles drew what was most advantageous for the art of rhetoric.

Isocrates 15.235: Pericles was a pupil of two sophists, Anaxagoras of Clazomenae and Damon; the latter was thought in his time to be the most sensible of his fellow citizens.

Plutarch *Life of Pericles* 4: But the one who most associated with Pericles and who most bestowed on him that dignity and wisdom more weighty than demagoguery, and on the whole raised up and exalted the worthiness of his character, was Anaxagoras of Clazomenae. Men used to call him Mind, either because of their amazement at his great and prodigious understanding of natural philosophy, or because he was the first to institute neither chance nor necessity as the principle of order in the universe, but rather mind, pure and unmixed among all the other mixed things, separating off the homogeneous stuffs.

Cicero *On the Orator* 3.138: No mere windbag taught Pericles to bark in time to the clepsydra,[4] but as we are told, it was *the* Anaxagoras of Clazomenae.

4 A *clepsydra* (in this sense of the word) is a water clock used to monitor the length of speeches. The word also refers to a household implement used for transferring liquids, as in A68 and A69.

A16

Plutarch *Life of Pericles* 6: These are not the only advantages that Pericles enjoyed because of his connection with Anaxagoras. It seems that Pericles rose above superstition, that attitude of astonishment about celestial occurrences that is produced in those who are ignorant about the causes of things and who are crazed by divinity and divine interventions because of their inexperience in these areas. Natural philosophy substitutes for festering superstition that unshaken piety that is attended by good hopes. It is said that once the head of a one-horned ram was brought to Pericles from the country; Lampon the soothsayer, when he saw that the horn had grown strong and firm from the middle of the forehead, said that, whereas there were two factions in the city, those of Thucydides and Pericles, sovereignty would pass to the one to whom the omen came. But when the skull was cut in two, Anaxagoras demonstrated that the brain had not filled out its space, but was pointed, like an egg, and had pulled away from the skull to the very spot from where the root of the horn had its starting place. Then Anaxagoras was admired by all who were present. But a little later, when Thucydides had been overthrown and Pericles had taken charge of public affairs, it was Lampon who was admired. Nevertheless, there was nothing, I suppose, that prevented both the physical scientist and the soothsayer from being right; for the one rightly understood the cause and the other the purpose of the event.

A17

Plutarch *Life of Pericles* 32: At about this time . . . Diopeithes introduced a bill that those who did not recognize the gods, or who taught theories of the heavens, be prosecuted, thus drawing suspicion against Pericles through Anaxagoras . . . [Pericles] feared for Anaxagoras and sent him out of from the city.

Diodorus of Sicily 12.39: Furthermore, they also brought evidence of impiety towards the gods against Anaxagoras the sophist, teacher of Pericles.

A18

Plutarch *Life of Nicias* 23: Although he was the first to put in writing the clearest and boldest of all the theories about the waxing and the waning of the moon, Anaxagoras himself was not venerated nor was his theory the best known; it was as yet secret, and circulated among a few people with some discretion rather than with boldness. For, at the time, people did not tolerate the natural philosophers and the so-called stargazers, because

they reduced the divine to unreasoning causes, non-providential forces, and necessary happenings. So, Protagoras went into exile, and Pericles barely saved Anaxagoras, who had been imprisoned.
Eusebius *Chronicles* [79th Olympiad, 3rd year = 462/1]: 1554 years after Abraham, there was an eclipse of the sun. Anaxagoras died.

A19

Josephus *Against Apion* 2.265: Anaxagoras was from Clazomenae, but because he said that the sun was a red-hot stone, the Athenians, who supposed that it was a god, condemned him to death by a few votes.
Olympiodorus *Commentary on Aristotle's Meteorologica* 17.19: . . . only the stars are fiery, so Anaxagoras, too, called the sun 'red-hot iron' [*mudros*] on account of the enormity of its burning, for *mudros* is iron that has been heated to be red hot. Wherefore Anaxagoras was ostracized by the Athenians for having the boldness to say this sort of thing. Later, because of the rhetorical skill of Pericles, he was recalled; for it happened that Pericles was a pupil of Anaxagoras.

A20

Philodemus *Rhetoric* 2.180: A slave of . . . [Cleon?] . . ., who had been flogged, gave information to the jurors against Anaxagoras; Cylon of Croton, by bringing charges against Pythagoras, banished him from the city, and destroyed his assembled disciples by fire.[5]

A20b

Pseudo-Iamblichus (?) *Arithmetical Theology* 6.18: Euripides, because he was a pupil of Anaxagoras, describes the earth this way: 'The wise among mortals suppose you to be a hearth.'
Euripides fragment 944: And mother Gaia [Earth]: The wise among mortals call you a hearth seated in the aether.

A20c

A20c is concerned with evidence for the relation between Anaxagoras and Euripides.[6] Satyrus, a biographer of the third century BC, wrote a collection of *Lives*, including a biography of Euripides, written as a dialogue (Diels remarks that it is a 'learned interpretation'). Four damaged pages of this

5 The text, particularly the part dealing with Anaxagoras, is doubtful.
6 This entry is peculiar in being composed partially of ancient texts, and partially of Diels's comments and explanations. I have summarized Diels's comments and translated the texts that are relevant to Anaxagoras.

were found at Oxyrynchus; in places the papyrus is only partially legible. At Fragment 37c 1 line 22 (139 in Hunt's edition of the Oxyrhynchus Papyrus), there is a mention of Anaxagoras; in DK it appears as 'then he admired (?)[7] Anaxagoras exceedingly . . .'[8] Satyrus then goes on to quote from Critias's *Peirithous* (see DK 88B19), attributed to Euripides; next (37c 3 line 9) he cites Euripides fragment 912, and adds a comment: '"To you, the ruler of all things I bring green shoots and cakes, whether you have the name of Zeus or Hades . . ." [Euripides] has accurately comprehended the whole of Anaxagoras's world order, containing it in three (words; verses?).[9] Indeed in another place he puzzles about what rules the heavens: "Zeus, the necessity of nature, or the mind (*nous*) of mortals . . ." (Euripides *Trojan Women* 886).' The next two columns of the papyrus are probably lost. Diels then continues, giving Satyrus's quotation of Euripides fragment 913, which seems to endorse a belief in divine power, rather far from Anaxagoras's own views. After registering praise for hard work (*ponos*) and contempt for wealth (*ploutos*), the papyrus goes on to discuss the relation between Euripides and Socrates.

A21

Aulus Gellius *Attic Nights* 15.30: Alexander of Aetolia composed these verses about Euripides:

In my opinion, the pupil of good Anaxagoras was harsh to speak out
with hatred of laughter,
not even having learned to banter when drunk;
but what he wrote was crafted with honey and Siren-songs.

Aelian *Miscellanies* 8.13: They say that Anaxagoras of Clazomenae was not seen to laugh or smile at all.

A22

Athenaeus *Sophists at Dinner* 5.220B: Aeschines' *Callias* includes the argument between Callias and his father and mockery of the sophists Prodicus and Anaxagoras. He says that Prodicus formed his pupil Theramenes,

7 The text is uncertain here. Diels supplies 'admired'; Hunt, in his text of the Oxyrhynchus Papyrus, supplies no verb.

8 Again the text is uncertain; at this point the papyrus contains the letters φυσ (*phys*), which might be a reference to 'nature' or 'physics' (*physis*).

9 Another uncertain text. If Satyrus wrote 'three words,' which are the ones that are supposed to show Euripides' accurate grasp of Anaxagoras's system? Perhaps 'τῷ πάντων μεδέοντι (the ruler of all things)'? It is not clear from the extant fragments why this phrase should be taken to be particularly Anaxagorean.

and Anaxagoras shaped Philoxenus son of Eryxis, and Ariphrades, the brother of the cithera player Arignotus. Aeschines wished to expose the teaching of these educators, using as evidence their pupils' wickedness and insatiable appetite for what is base.

A23

Alcidamas; cited in Aristotle's *Rhetoric* 2.23 1398b15: The people of Lampsacus paid tribute to Anaxagoras with a funeral (even though he was a foreigner), and honour him even now.

A24

Aelian *Miscellanies* 8.19: This has been written in homage to Anaxagoras: 'Anaxagoras, who reached the furthest limit of truth / about the heavenly cosmos, lies here.' [It is said] that an altar was set up for him, inscribed on one side with 'Mind,' on the other with 'Truth.'[10]

A25

Diogenes Laertius *Lives of the Philosophers* 2.46: According to Aristotle in the third book of the *Poetics* ... Sosibius criticized Anaxagoras. [Sosibius is apparently otherwise unknown.]

A26

Diogenes Laertius *Lives of the Philosophers* 10.12: Diocles reports that, among the ancients, [Epicurus] approved most of Anaxagoras, even though he disagreed with him about some things, and also of Archelaus, the teacher of Socrates.

A27

Here Diels gives a discussion of coins from Clazomenae, bearing the inscription ΚΛΑΖΟΜΕΝΙΩΝ, from both Hellenistic and Roman periods that

10 The text of the last clause is difficult. Diels, perhaps using Hercher's Teubner edition of Aelian's *Varia Historia* (1866) gives the text as οἱ μὲν Νοῦ οἱ δὲ Ἀληθείας. In Dilts's more recent Teubner edition (1974), Dilts reports that all the manuscripts read ὁ μέν ... ὁ δέ, and that is what Dilts prints. This could mean that the altar was inscribed with 'Mind' on one side, and 'Truth' on the other, or it could mean that it was an altar dedicated to both. Various suggestions have been made about how to make sense of the text, including, Dilts reports, a proposal (by Gessler) to change the noun to the dual (with corresponding change in verb) so that there were two altars. Thanks to Carl Huffman for help with this problem.

show images of Anaxagoras. Guthrie (2:269 n. 1) discusses the various examples. An image of what DK calls Type I (with Anaxagoras seated on a globe with raised right hand) appears in volume 3 of *Fragmente der Vorsokratiker* p. 2.[11] DK's Type II (with a standing figure holding a globe, from the time of the Roman Emperor Commodius) is on the cover of Guthrie's second volume. Type III has a bust of Anaxagoras holding a globe in his right hand.

MAXIMS

A28

Aristotle *Metaphysics* 4.5 1009b25: A saying of Anaxagoras to some of his friends is also recorded, that things will be for them such as they suppose them to be.

A29

Clement *Miscellanies* 2.130: Anaxagoras of Clazomenae, they say, claimed that the goal (*telos*) of life is contemplation and the freedom that it brings.

A30

Aristotle *Nicomachean Ethics* 6.7 1141b3: That is why people say that Anaxagoras and Thales and that sort of person have wisdom but not practical wisdom, when they see them to be ignorant of what is beneficial to themselves. People say that thinkers like that know extraordinary, amazing, difficult, and divine things that, nevertheless, are useless because they do not inquire into the human goods. **10.9 1179a13**: It seems that Anaxagoras thought that the happy person would have neither wealth nor power, saying that it would not be surprising if the happy person seemed odd to most people.

***Eudemian Ethics* 1.4 1215b6**: Asked who is the happiest, Anaxagoras of Clazomenae replied, 'None whom you might think, but one who will appear odd to you.' He answered this way, understanding that the person asking the question supposed it impossible for someone who is not grand, fine, or rich to deserve the name. Anaxagoras himself perhaps supposed that one living free of pain, and honest in matters of justice, or who engaged in contemplation of divine things is, as far as humanly possible, blessed. **1.5 1216a11**: They report that someone was raising difficulties about this sort

11 In the text of A27, DK date this version to about 100 BC, and assert that Anaxagoras is seated on a column drum; Guthrie says 'after 300 B.C.' and describes the figure as seated on a globe, not a column drum.

of thing and quizzing Anaxagoras about why someone should choose to be born rather than not. Anaxagoras replied, 'For the sake of contemplating the heavens and the whole order of the universe.'

Euripides, Fragment 910:

Happy is he who has gained knowledge of inquiry,
who is moved neither to hostility towards fellow citizens,
nor to unjust acts,
but who contemplates the ageless order
of deathless nature, to what end it was put together,
and in what manner, and how.
To such as these, anxiety about shameful deeds
never clings.

A31

Valerius Maximus ***Memorable Doings and Sayings*** **8.7.6**: How great the zeal with which Anaxagoras must have burned! When he had returned home after an extended journey abroad and saw his estates abandoned, he said, 'I would not have been safe unless they had perished.' A saying possessed of sought-after wisdom! For if he had given his time to the cultivation of his property rather than of his mind, he would have remained master of domestic things, among the household gods, and would not have returned to them the great Anaxagoras.

A32

Plutarch ***Life of Pericles*** **16**: They say that since Pericles was busy, Anaxagoras, who was now old, was lying uncared for, with his face covered, starving. When the news was announced to Pericles, he was stricken, and straightaway ran to him and entreated the man zealously, lamenting, not for Anaxagoras, but for himself, that he should lose such an adviser in matters of state. At that point, Anaxagoras uncovered his face and said to him, 'Pericles, even those who have need of a lamp pour oil into it.'

A33

Galen ***On the Theories of Hippocrates and Plato*** **4.7**: For this reason [Posidonius] says *to familiarize* oneself with things before they occur and experience them as though they were present. For Posidonius the word *to familiarize* means something like to resolve to anticipate or to conceive for oneself beforehand what is about to happen and so to have already become habituated to make little of it. And that is why he has adopted here the

saying of Anaxagoras, who, when someone announced the death of his son to him, said very calmly, 'I knew I begat a mortal,' just as Euripides took the thought for himself, and made Theseus say (fr. 964),

Having learned from some wise man
I always put fitting thoughts in my mind
Anticipating to myself banishment from my country,
Untimely deaths, and other sorts of evil,
So if something should befall that I have conceived in my heart,
What befalls would no longer sting me as something new.

***Alcestis* 903**:

Among my kin,
one had a boy, an only child, worthy of lamentation,
who died in his house; yet he endured
abundant evil: childless,
being already grey-haired,
far on in the path of life.

A34

Stobaeus *Florilegium* 4.52b.39: Anaxagoras says that there are two rehearsals for death: the time before birth and sleep.

A34a

Cicero *Tusculan Disputations* 1.43.104: How nobly Anaxagoras answered friends when he was dying at Lampsacus; they were asking whether he would like to be brought to his home in Clazomenae if something should happen. 'There is no need,' he said, 'for in truth the roads to the underworld are the same from anywhere.'

WRITINGS

A35

Plato *Apology* 26e7–d9: [The speakers are, first, Meletus, one of the accusers of Socrates, and then Socrates himself.] 'That is what I mean, that you do not believe in the gods at all.' 'You are amazing Meletus! Why do you say this? Do I not think that the sun and the moon are gods, just as other people do?' 'No, by Zeus, men of the jury, he does not, because he says that the sun is a stone, and that the moon is earth.' 'Do you imagine that you are prosecuting Anaxagoras, my dear Meletus, and are you so

disdainful of the jury; do you suppose they are so illiterate that they do not know that the books of Anaxagoras of Clazomenae are full of these doctrines? And do you suppose that the young men in fact learn from me these views, which they can acquire from time to time for a drachma (at most) in the orchestra,[12] and laugh at Socrates, if he pretends that they are his own . . . ?'

A36

Clement *Miscellanies* 1.78: Yes, the teaching and the writing of these accounts came into Greece rather late. At any rate, Alcmaeon son of Perithos of Croton was the first to compose an explanation of the natural world; others report that Anaxagoras son of Hegesibulus of Clazomenae was the first to publish a book.

A37

Diogenes Laertius *Lives of the Philosophers* 1.16: Those with only one book include Melissus, Parmenides, Anaxagoras.

A38

Plutarch *On Exile* **17.607f**: But while Anaxagoras was in prison he wrote on the squaring of the circle.

A39

Vitruvius *On Architecture* 7 Preface, 11: To begin, when Aeschylus was producing a tragedy in Athens, Agatharchus made the scenery and left a

12 Some commentators and translators suggest that the orchestra was the part of the Agora where there were bookshops; so, for instance, Guthrie, 2:269, suggests that the young men buy books there. In contrast, the commentary on the *Apology* by de Strycker and Slings states, 'what the young men can occasionally procure for money are not books, but the contents of Anaxagoras' teaching. There is no suggestion whatsoever of the young men buying books' (308). Thus, the young pay a drachma (at most) to hear a reading or explanation of Anaxagoras's views. Nevertheless, the context, especially the claim that Meletus is wrongly implying that the jury are illiterate, suggests that the young men are able to read, and that Socrates means that they are buying books, and not just the chance to hear a book read. Ferguson argued that *used* books were sold in the orchestra: he cites Erectheum accounts that shows that 'two sheets of paper for keeping accounts cost two drachma four obols'; thus books must have been more expensive. Ferguson says that the low price for Anaxagoras' old book (one drachma 'at most') indicates that 'what we have here is an early example of a second-hand bookshop or remainder sale' (Ferguson 173). Brumbaugh follows Ferguson; this seems as good a solution as we can hope to the problem.

discussion of it. On the basis of these instructions, Democritus and Anaxagoras wrote about the same thing, that is, how it is necessary, once a central fixed point is established, that lines correspond with the pupil of the eyes and the projection of its rays in accordance with a natural principle, so that from something indefinite, definite images of buildings become evident in the paintings on the scenery, and that some of the things that are depicted on upright flat surfaces would seem to recede and others of them to project.

A40

Munich Codex 490 s. 15, fol. 483v [Miscellanea, vgl. Hardt 5 141] (15th century): Concerning Anaxagoras: Some say Anaxagoras wrote a treatise on insoluble questions, and called it *The Strap* because, so he thought, it tied readers up in its difficulties.

DOCTRINES

***Index* in Diogenes Laertius 5.42**: Theophrastus. *Against Anaxagoras*: 1 book; *About the Doctrines of Anaxagoras*: 1 book.

A41

Simplicius *Commentary on Aristotle's Physics* 27.2 (from Theophrastus): Anaxagoras son of Hegesibulus, a native of Clazomenae, who agreed with the philosophy of Anaximenes, was the first to modify views about the first principles, and he supplied the explanation that had been lacking;[13] he made the corporeal principles unlimited in number. He held that all the homogeneous stuffs, such as water or fire or gold, are ungenerated and indestructible, but only appear to come to be and pass away by means of compounding and separating apart, since everything is in everything, and since each thing is characterized by what predominates in it. For that in which there is a great deal of gold appears to be gold, although all things are present in everything. At any rate, Anaxagoras claims that 'in everything there is a share of everything' and 'each one is and was most manifestly those things of which there are the most in it' [B12]. Theophrastus says that Anaxagoras' assertions are similar to those of Anaximander; for he says that in the course of the separation of the unlimited, stuffs that are of the same kind are drawn towards one another, and that what was gold in the whole comes to be gold, and what was earth in the whole comes to be earth, and similarly for each of the others, as they do not come to

13 Probably a reference to the efficient cause – *Nous*.

be but were already present in the mixture before. Anaxagoras postulated Mind (*Nous*) as the cause of motion and coming-to-be; the things separated by Mind generated the world-orders and the nature of the other things. 'When these things are understood this way,' Theophrastus says, 'Anaxagoras would seem to make the material principles unlimited, and Mind the single cause of motion and coming-to-be; but, if someone were to consider the mixture of all things as a single nature, unlimited both in form and in extent, it follows that Anaxagoras claims that there are two principles, the nature of the unlimited and Mind; so he is clearly treating the material elements in a manner similar to Anaximander.' (See also Simplicius *Commentary on Aristotle's Physics*, 154.14–23, where Simplicius repeats Theophrastus's comment.) **166.15**: When Anaxagoras said that 'nor of the small is there a smallest but always a smaller [B3],' [he meant that] there is not a largest either. Anaxagoras's own text makes this clear; and so too does Theophrastus when he writes in the second book of his *On Anaxagoras* as follows, 'and then, it is unconvincing to say that everything is in everything because everything is unlimited both in largeness and in smallness and it is impossible to grasp either the smallest or the largest . . .'

A42

Hippolytus *Refutation of all Heresies* 1.8.1: (1) After Anaximenes, comes Anaxagoras son of Hegesibulus of Clazomenae. He said that the fundamental principle of everything is mind and matter – mind because it makes, matter because it comes to be. For when all things were together, Mind came and set them in order. He says that the material principles are unlimited and he calls the smaller of them unlimited (*apeira*).[14] (2) All things partake of motion through being moved by Mind, and the like things come together. The heavenly bodies have been arranged by circular motion; the dense and the wet and dark and cold and all the heavy things came together in the middle, and the earth formed by their coalescing. Their opposites – the hot and the bright and the dry and the light – rushed far out into the aether. (3) He held that the earth is flat in shape and that it remains suspended because of its size, and because there is no void, and also because the air, which is very strong, carries the earth, which rides on it. (4) As to the moisture upon the earth, he held that the sea sprang both from the waters in the earth (the evaporation of which was the source of what has remained) and also from the rivers that have flowed into it. (5) Rivers

14 This is unclear, but Hippolytus may be referring to Anaxagoras's claim in B1 that 'the small, too, was unlimited.'

are formed from rains and from the waters in the earth; for the earth is hollow and holds water in its cavities. The Nile increases during the summer when waters are carried into it from the snows in the southern regions. (6) The sun and the moon and all the stars are fiery stones all held together by the circular motion of the aether. Below the stars there are certain bodies, invisible to us, rotating with the sun and the moon. (7) We do not perceive the heat of the stars because they are so distant from the earth; in addition, they are not as hot as the sun because they occupy a cooler place. The moon is below the sun and closer to us. (8) The sun is larger than the Peloponnese. The moon does not have its own light, but that of the sun. The course of the stars is under the earth. (9) The moon is eclipsed when the earth blocks the sun's light (and sometimes also when the bodies under the moon do so); an eclipse of the sun occurs in the time of the new moon when the moon blocks the light. Both the sun and the moon turn when they are forced back by the air.[15] The moon is turned often because it is unable to overcome the cold. (10) Anaxagoras was the first to explain eclipses and the phases of the moon. He said that the moon is made of earth and has plains and ravines. The Milky Way is the reflection of the light of those stars that are not illuminated by the sun. The stars that pass overhead as though they were flying sparks [shooting stars; meteors] come to be from the motion of the vault of the heavens. (11) Winds arise from air rarefied by the sun and when things that are burning withdraw to the vault of the heavens and are carried back again. Thunder and lightning occur when heat falls into the clouds. (12) Earthquakes happen when air above the earth falls below it; for the earth riding on it is shaken by the air's movement. In the beginning, animals came to be in moisture, and after that from each other. And males are produced whenever sperm comes from the right side [of the testicles] and is fastened on the right side of the mother's [uterus]; females in the opposite case. (13) His acme *** <and death>[16] was in the first year of the eighty-eighth Olympiad [428], at the time, they say, when Plato was born. They also say that Anaxagoras was a prognosticator.

15 The *turning* of a heavenly body is probably meant to refer to one of the occasions when it reaches its highest or lowest elevation relative to the earth, and so 'turns' in its path. The turnings of the sun are the summer and winter solstices. The term might also apply to the motions of the heavenly bodies in their orbits. Anaxagoras seeks to offer similar explanations for changes in the motions of the sun, the moon, and the other heavenly bodies, relative to the fixed earth.

16 The text here is as Diels prints it in DK. In the doxographers, a man's acme (or the height of his career) was usually said to be in his fortieth year. See Essay 1 for a discussion of the problems in determining chronology for Anaxagoras.

A43

Aristotle *Metaphysics* 1.3 984a11: Anaxagoras of Clazomenae, who was older in age than Empedocles, but later in his work,[17] says that the principles are unlimited. He says that almost all of the homogeneous stuffs come to be and pass away in this way (just as water or fire do), viz., only by aggregating and dissociating; they are not generated or destroyed in any other sense, but persist eternally.

***On the Heavens* 3.3 302a28**: Anaxagoras says just the opposite of Empedocles about the elements. For [Empedocles] claims that fire and earth,[18] and things of the same rank, are elements of bodies and that all things are compounded of them; but Anaxagoras says the opposite. For he claims that the homogeneous stuffs are elements – I mean, for instance, flesh and bone and each of the things of that sort – and that air and fire are mixtures of them and of all the other seeds; for each of them is a collection of all the invisible homogeneous stuffs. This is why everything comes to be from these two. (For he calls fire and aether the same thing.)

A44

Lucretius *On the Nature of Things* 830–914 (translation by W.H.D. Rouse, revised by Martin Ferguson Smith [Loeb edition]; slightly modified): Now let us also examine the *homoiomeria* of Anaxagoras, as the Greeks call it, which cannot be named in our language because of the poverty of our mother tongue [Latin], but yet it is easy to explain the thing itself in words.

First, as to what he calls the *homoiomeria* in things, he clearly holds that bones are made of very small and minute bones, flesh of very small and minute particles of flesh, and blood is composed by many drops of blood coming together into union, and he thinks gold may consist of grains of gold, and earth to be a concretion of small earths; fire of fires, water of waters; he fancies and imagines the rest in the same way. But he refuses to allow void anywhere in things, or to place any limit to the cutting-up of bodies. Therefore he seems to me wrong in both these views equally with those we have already mentioned above.[19]

Add that he adopts primary elements which are too weak, if indeed those are 'primary elements' which are endowed with a nature similar to

17 Aristotle is defending his decision to discuss Anaxagoras after Empedocles in *Met.* 1. See Essay 2.

18 Diels's text mistakenly omits καὶ γῆν ('and earth').

19 Heraclitus, Empedocles, and their followers, whom Lucretius has discussed earlier in book 1.

the things themselves, and equally suffer and pass away, nor does anything curb them back from destruction. For which of these will endure under crushing pressure, so as to escape death between the very teeth of destruction? Fire or water or air? Which of these? Blood or bones? Nothing, as I think, when everything alike will be in its essence as perishable as what we see manifestly pass away from our sight overcome by some violence. But I appeal to what has already been demonstrated,[20] to prove that things can neither fall back into nothing, nor again grow out of nothing.

Besides, since food increases the body and nourishes it, we may know that veins, and blood and bones [and sinews are made of parts not like themselves;][21] or, if they say that all foods are made of miscellaneous substance, and contain within them small bodies of sinews and bones and also veins and particles of blood, it will follow that all food itself, both solid food and liquid, is held to consist of things unlike itself, bones and sinews, pus and blood commingled. Besides, whatever bodies grow out of the earth – if they are in the earth – then the earth must consist of things unlike itself which arise out of it. Apply this reasoning to other cases, and you may use the very same words. If flame, if smoke and ashes are hidden in wood, the wood must necessarily consist of things unlike itself, of unlike things which arise out of the wood. Besides, whatever bodies the earth nourishes and increases [must consist of things unlike themselves, which in their turn must contain things unlike themselves].[22]

Here is left some slight opportunity for evasion, which Anaxagoras turns to advantage in supposing that all things are hidden immingled in all things, but that alone appears which preponderates in the mixture and is more to be seen and placed right in the front. But this is far removed from true reasoning. For then it were proper that corn also, when it is being ground by the crushing strength of the millstone, should show often a sign of blood or something of those substances which are nourished in our bodies; and when we rub with stone upon stone the blood should trickle. In the same way, it were fitting that herbage also and water should often emit drops sweet and of like flavour to the milk from the udders of fleecy ewes; and assuredly when clods of earth have been crumbled, various kinds herbage ought often be seen, and corn, and leaves, scattered about and lurking amid the earth in small portions; lastly when wood is broken, smoke and ashes and fire should be seen lurking in small portions.

20 Earlier in book 1.

21 Text as in Rouse.

22 There is a textual problem; I follow the text of Rouse, who says, 'The passage within brackets gives what is, according to Bailey, the likely sense of the missing argument.'

But since plain matter of fact teaches that nothing of this is to be seen, we may know that things are not thus mixed up in things, but seeds common to many things must in many ways lurk immingled in things.

'But,' you say, 'often on great mountains it happens that the topmost branches of tall trees, being close together, are rubbed one against another when the strong south winds compel them so to do, until the flower of flame breaks out and they blaze.' Assuredly; and yet fire is not implanted in the wood, but there are many seeds of heat which stream together by rubbing and make a conflagration among the forests.[23] Whereas, if the flame were hidden in the forests ready made, the fires could not be concealed for a moment, they would consume the forests everywhere, burn up the trees. Do you see now, as I said a little while ago, that it is often of very great importance with what and in what position these same primary elements are held in union, and what motions they impart and receive mutually, and how the same elements a little changed in relations create fires and firs? Just as the words themselves too consist of elements a little changed, when we mark 'firs' and 'fires' [*ligna atque ignes*] with a distinct name.

A45

Aristotle *Physics* 3.4 203a19–33: Those who make the elements unlimited in number, as Anaxagoras and Democritus do, say that the infinite is continuous by contact: according to the former, of his homogeneous stuffs; according to the latter, of his seed-mass of the shapes. Further, Anaxagoras says that any of the parts is a mixture just as the whole is, because of the observation that anything comes to be from anything. This is probably why he says that at one time all things were together, for instance, this flesh and this bone, and thus anything, therefore all things, and hence all at the same time. There is a beginning of separation, not only in each case but also for everything. Since what comes-to-be is generated from this sort of body, and there is coming-to-be of all things (but not at the same time), then it is necessary that there be some first principle of coming-to-be, which is one, such as what Anaxagoras calls Mind (*Nous*). Now, *Nous*

23 This passage is quite similar to a comment in Thucydides about the fire set by the Peloponnesians at Plataea: 'The consequence was a fire greater than any one had ever yet seen produced by human agency, though it could not of course be compared to the spontaneous conflagrations sometimes known to occur through the wind rubbing the branches of a mountain forest together' (Book 2.77.4; *The Peloponnesian War* [London: J.M. Dent; New York: E.P. Dutton, 1910]). Calder suggests that Thucydides is quoting Anaxagoras.

took thought and began work from some beginning point, so that it is necessary that at one time all things were together and began to be moved at some time.

Simplicius ***Commentary on Aristotle's Physics*** **460.4**: Because Anaxagoras postulates the homogeneous stuffs and Democritus the atoms (so that each proposes first principles that are infinite in number) Aristotle first inquires into the opinion of Anaxagoras and explains why Anaxagoras came to this sort of supposition. He shows that it was necessary that he say not only that the whole mixture is unlimited in extent but also that each homogeneous stuff is also unlimited, since it is just like the whole and has all things in it, and not just unlimited things but unlimitedly unlimited things. Anaxagoras came to this view supposing that nothing comes to be from what-is-not and that everything is nourished by its like. He saw that everything comes to be from everything, if not immediately then in order (for air comes from fire, and water from air, earth from water, stone from earth, and fire comes once again from stone) and that by taking in the same food (such as bread) many different things come to be – fleshes, bones, veins, sinews, hair, nails and (if circumstances are favourable) feathers and horns – and that like is augmented by like. Because of this he supposed that these things are in the food, and that if trees are nourished by water, wood and bark and fruit are in it. Thus, he said that everything is mixed in everything and that coming-to-be occurs by separation. And with respect to this, perhaps he also maintained that some things remain when other things come to be from them, such as fire from stone and air from bubbling water. He observed everything separating off from each of the things that has now been made distinct, as for instance, flesh and bone and other things are separated off from bread, as though all were present at the same time and mixed together in it, and from these observations he conjectured that indeed all the things that are were formerly mixed together before they were separated. This is why he began his book this way, 'All things were together' [B1] so that 'everything whatsoever is a mixture resembling the all,' just as this bread is a mixture of both this flesh and this bone. **1123.21**: Anaxagoras seemed to say that after all things were together and at rest for an unlimited earlier time, cosmos-making *Nous*, wishing to separate the forms (which he calls *homogeneous stuffs*), put motion into them.

A46

Aristotle ***On Coming to Be and Passing Away*** **1.1 314a18**: [Anaxagoras] makes the homogeneous stuffs elements, for instance, bone and flesh and

marrow and the others of which the part is called by the same name [as the whole].

Aëtius 1.3.5: Anaxagoras son of Hegesibulus of Clazomenae declared that the homogeneous stuffs are the first principles of things. For it seemed to him most inexplicable that something is able to come to be from what-is-not or perish into what-is-not. Now, we ingest simple food of a single kind, such as bread and water, and by this hair, veins, arteries, flesh, sinews, bones, and the other parts [of the body] are nourished. Because these things happen, one must agree that all the things that are are in the ingested food, and that all things grow from the things that are. One must also agree that in each bit of food there are parts generative of blood and sinews and bones and all the rest, and these are parts that may be grasped by reason. There is no need to submit everything to the rule of sense perception, and agree that bread and water supply these things; rather there are parts in them discernible by reason. Because the parts in the food are like the things produced he called them homogeneous stuffs and declared that they are the principles of the things that are; the homogeneous stuffs are the matter, and mind is the creative cause setting all things in order. He begins like this: 'all *chrēmata* were together, and *Nous* arrived and set them in order'; (he means 'things' by *chrēmata*). He is worthy of tribute then, because he linked the maker to the matter.

Plato *Phaedo* 96c–d: [Socrates is speaking about causation and explanation.] . . . I forgot what I earlier supposed I knew about many other things, even about why a man grows! For I thought before that it was obvious to everyone that it is because of eating and drinking. For, whenever he eats, from the foods flesh is added to flesh and bones to bones, and the appropriate thing is added to each of the parts for the same reason, so that the small bulk then becomes greater, and thus the small man becomes large. That is what I thought then. Does that not seem reasonable to you?

A47

Plato *Phaedo* 97b8–98c2: [Socrates is speaking.] But once I heard someone reading from a book by Anaxagoras, so he said, and claiming that, in fact, Mind is the arranger and the reason for everything. I was well pleased with this explanation, and it seemed to me somehow good to have Mind be the reason for all things; and I supposed that, if this were so, Mind, would, in ordering, order everything, and place each thing in the best way . . . I thought that I had found in Anaxagoras a teacher about the reason for the things-that-are of the same mind as myself. I thought that he would

tell me, first whether the earth is flat or round, and after this, he would go on to explain why it is so of necessity, saying which was better, and that it was better to be this way. And if he were to say that the earth is in the middle, he would go on to explain that it was better that it be in the middle. And if he were to demonstrate these things to me, I was ready to give up yearning for another kind of explanation. Furthermore, I was prepared to learn, in just the same way, this sort of thing about the sun and the moon and the other stars, about their relative velocity, their turnings, and other things that happen to them – how it was better that each act and be acted on just as it is. For I never thought that, having said that these things have been ordered by Mind, he would introduce any other explanation for them than that it is best that things be just as they are. Having given the reason for each of them and the general reason for all of them, he would, I supposed, go on to explain the best for each and the common good for all. And I would not have given up my hopes for a fortune! Eagerly getting hold of his books, I read them as fast as I could, in order to know as quickly as possible what was the best and the worse. I gave up this wonderful hope, my friend, because, on further reading, I saw a man making no use of Mind, nor ascribing to it any responsibility for the ordering of things, but giving as reasons airs, aethers, waters, and many other odd things.

Aristotle *Metaphysics* 1.4 985a18: Anaxagoras uses *Nous* as a *deus ex machina*[24] in world making, and he drags it in whenever he is puzzled about the reason why something is as it is necessarily, but in other cases he makes the causes of what happens everything except *Nous*.

Simplicius *Commentary on Aristotle's Physics* 327.26: Eudemus reports that despite having allowed for *Nous*, Anaxagoras introduces the agency of chance for most things.

A48

Aëtius 1.7.5: Anaxagoras says that at the beginning the bodies had been motionless and that the mind (*Nous*) of god ordered them and produced the comings-to-be of the whole. **1.7.15**: Anaxagoras says that god is mind, the maker of the *kosmos*.

Euripides fragment 1018: For *nous* is god in each of us. (See also *Trojan Women* 886: 'Zeus, the necessity of nature, or the mind (*nous*) of mortals . . . ')

24 Ross, in his commentary on the *Metaphysics* (1:137) says, '*μηχανή*, as is shown by the word *παρέλκει* (*drags*), refers to the stage *deus ex machina*.'

Iamblichus *Protreptricus* **8**: 'Our mind (*nous*) is god'; either Hermotimus or Anaxagoras said this.
Philodemus ***On Piety*** **c. 4a**: God was and is and will be and rules and controls all things. *Nous* arranged the whole mixture, which was unlimited.
Cicero: ***On the Nature of God*** **1.11.26**: Then Anaxagoras, who was taught by Anaximenes, was the first to maintain that the order and disposition of all things is designed and perfected by the power and reason of an unlimited mind. In saying this he did not see that it is impossible for motion to be joined with sensation and contained in something unlimited, or for there to be any sensation at all in that which does not sense by virtue of its whole nature being affected. Moreover, if he wanted this mind to be a certain sort of living thing, there must be something internal to it in virtue of which it is called an animal. But what is more internal than mind? That is why it is surrounded by the outer body. But that is not acceptable [to him]; consequently, a naked and simple mind, joined to nothing through which it can sense, seems to evade the power and intelligence of our reason.

A49

Cicero: ***Academica Pr.*** **2.37.118**: Anaxagoras held that matter is unlimited, but that out of it come minute particles similar to one another; at first these were all mixed together, but later they were put in order by a divine mind.

A50

Aristotle ***Physics*** **3.5 205b1**: Anaxagoras speaks absurdly about why the infinite is at rest. For he says that the infinite itself fixes itself in place. He says this because it [the infinite] is in itself, for nothing else encompasses it, as though wherever something is, it is there by its own nature.
[Aristotle] ***On Melissus, Xenophanes, and Gorgias***[25] **2 975b16**: But even if these things were unlimited from the beginning, i.e., those from which things come to be through combination and are destroyed through dissociation, – just as some say Anaxagoras means when he says that generated things come to be from eternal and unlimited beings – even so, not everything would be eternal; for there would be some things that are coming to be and that have come to be from the things that are, and passing away into other kinds of being. **976a14**: Now when [Melissus] says that the All

25 Text as in DK 30A5.

is the same, he does not mean it in the way that a thing is similar to something else. (Anaxagoras questions just this – that the unlimited is the same – for the similar is similar to *something* else, so that being two or more it would no longer be one or unlimited.) Yet perhaps [Melissus] means that it is the same as itself. **976b19**: But even if there is no void, why should not something move? Since even Anaxagoras (who devoted attention to this question and for whom it was not enough merely to assert that there is no void) says that the things that are move even though there is no void.

A51

Aëtius 1.14.4: Anaxagoras says that the homogeneous stuffs have many shapes.

A52

Aristotle *Physics* 1.4 187a26: Anaxagoras probably supposed [the principles] to be unlimited in this way because he accepted as true the common opinion of the physicists that nothing comes to be from what is not. That is why they say: 'all things were together' [B1], and why Anaxagoras makes the generation of a thing of a certain sort into alteration [see B17].
Aristotle *On Coming to Be and Passing Away* 1.1 314a11: Those who make the matter of things more than one, such as Empedocles and Anaxagoras and Leucippus, must say that coming-to-be and alteration are different. Yet Anaxagoras disregarded his own words; at any rate, he makes coming-to-be and passing-away the same as alteration.
Hippocrates *On Regimen* 1.4: Not a single one of all the things either passes away or comes to be what it was not already before; but, instead, being mixed together and dissociating, they alter.

A53

Simplicius *Commentary on Aristotle's Physics* 461.20: This is why Anaxagoras says that it is not possible that everything be separated off; for the separation is not a complete severance.
Plato *Phaedo* 72c: 'It is not difficult to understand what I mean,' Socrates said. 'For example, if falling asleep existed, but not the opposite process of waking up from sleeping, you know that in the end it would reveal the story of sleeping Endymion to be mere idle nonsense. He would be nowhere, because everything else would be in the same state as he, fast

asleep. If everything were mixed together, but there were no separation, then soon the Anaxagorean state would occur: all things together.'

A54

Aëtius 1.17.2: The Anaxagoreans and Democriteans say that mixtures come to be through the juxtaposition of the elements.

A55

Plato *Cratylus* 413c: Someone else laughs at all these other accounts. He says that justice is what Anaxagoras says: it is *Nous*. For Anaxagoras says that mind is self-ruling, mixed with nothing else, and it orders all the things that are, passing through everything.
Aristotle *On the Soul* 1.2 405a15: Anaxagoras seems to say that soul and mind (*Nous*) are different ... but in fact he treats the two of them as a single thing, except that he above all makes *Nous* the principle of all things. At any rate he says that, alone of the things that are, it is simple and unmixed and pure. He assigns both knowing and moving to the same principle, saying that *Nous* moves the whole.

A56

Aristotle *Physics* 8.5 256b24: That is why Anaxagoras speaks the truth when he says that *Nous* is impassible and unmixed, since he makes it the cause of motion. For it could move things only if it is unmoved, and rule only if it is unmixed.

A57

Clement *Miscellanies* 2.14: Yet even if Anaxagoras were the first to set *Nous* over things, not even he preserved the making cause; rather, he depicts some unintelligent whirls together with the inactivity and thoughtlessness of *Nous*.

A58

Aristotle *Metaphysics* 1.3 984b15: When someone said that *Nous* is present – in nature just as it is in animals – as the cause of the cosmos and of all its order, he appeared as a sober man among the random chatterers who preceded him. We know that Anaxagoras clearly held these views, but Hermotimus of Clazomenae gets the credit for holding them earlier.

A59

Simplicius *Commentary on Aristotle's Physics* 1185.9: Eudemus criticizes Anaxagoras not only because he says that motion began at a certain time and that it did not exist before then, but also because he neglected to say whether it will continue or will cease at some time, although these things are not obvious. 'For,' he says, 'why is it not possible to suppose that at some time everything comes to a halt through the agency of *Nous*, in just the way that Anaxagoras said that it moves everything?' Eudemus also criticizes Anaxagoras's view: 'How is it possible for some deprivation to exist before its opposite state? If rest is really the absence of motion, it would not exist before motion.'

A60

Aristotle *Metaphysics* **10.6 1056b28**: For this reason Anaxagoras erroneously abandoned the subject when he said 'all things were together unlimited in number and in smallness'; he ought to say 'and in fewness' rather than 'and in smallness.' For fewness is not unlimited, since 'the few' is not made by one, as some say, but by two.[26]

A61

Aristotle *Metaphysics* 12.2 1069b15: Since what-is is said in two ways, everything changes from that which is potentially into that which is actually (for instance, from the potentially pale to the actually pale, and similarly in the case of growth and destruction), so that not only can something come to be incidentally from what is not, but everything comes to be from what is: of course it comes from what is in potentiality, and from what is not in actuality. And this is the One of Anaxagoras; for rather than 'all things together,' and the mixture of Empedocles and of Anaximander, and what Democritus says, it is better to say 'all things were together in potentiality, but not in actuality.' **1.8 989a30**: If one were to presume that Anaxagoras says that there were two elements, one would, with good reason, posit a view that Anaxagoras himself did not state clearly, but which he would be forced by necessity to accept if someone were to point it out to him. It is absurd to say that all things were mixed together at the beginning: for

26 In this rather puzzling passage, Aristotle criticizes what Anaxagoras says in B1. In his commentary on the passage, Ross explains that Aristotle thought that in B1 'Anaxagoras meant to be mentioning opposites; and the opposite of multitude [or the unlimited] is not smallness but fewness,' and adds that two is 'the absolute few' (Ross 2:296, 297).

various reasons, especially because it follows that they must have existed before unmixed, and also because it is not in the nature of things that any chance thing can be mixed with any other chance thing. Moreover, it follows from this that qualities and accidents could be separated from substances (for there is mixture and separation of the same things). Nevertheless, if someone were to follow up saying clearly what Anaxagoras wished to say, perhaps he would appear to speak in a more modern way. For when nothing had been separated off, it is obvious that nothing could have been said truly about that substance; I mean, for instance, that it was neither pale nor dark, or medium, or any other colour, but it was necessarily colourless, for otherwise it would have had one of these colours. In the same way, and by this same argument, that substance was flavourless, nor did it have any other character like this. For it is neither some quality nor quantity nor any particular thing. For one of the so-called particular forms would belong to it, and this is impossible if all things were mixed together, for the particular form would have already separated off. But he says that all things were mixed except *Nous*, and that this alone is unmixed and pure. From all this it follows that he must say that the principles are the One (for this is simple and unmixed) and the Other, which is such as we think the indeterminate is before it is defined and partakes of some form.

A62

Diodorus of Sicily 1.7.7: It likely that Euripides does not disagree with what I have just said about the nature of the whole (since he was the pupil of Anaxagoras the natural philosopher). For, in the *Melanippe*, he proposes this:

'This story is not from me but from my mother,
how heaven and earth were one form;
and when they were separated apart from each other,
they gave birth to all things and brought them into the light:
trees, birds, beasts, those who are sea-nourished
and the race of mortals.'

A63

Aëtius 2.1.2: Thales ... Anaxagoras, Plato, Aristotle, and Zeno say that the cosmos is one.

A64

Simplicius *Commentary on Aristotle's Physics* 154.29: Anaxagoras said that the world-order, which arises only once out of the mixture, controlled and separated off by attending *Nous*, endures for the rest [of time]. **1121.21**: Anaxagoras, Archelaus, and Metrodorus of Chios seem to claim that the world-order arose at the beginning of time. They assert that motion, too, had a beginning. For, while things were previously at rest, they claim that motion – on account of which the world-order has arisen – was initiated by *Nous*. It is evidently for expository purposes that they posited a beginning for the making of the world-order.

A65

Aëtius 2.4.6: Anaximander, Anaximenes, Anaxagoras, Archelaus, Diogenes, and Leucippus say that the world-order is perishable.

A66

Aëtius 1.29.7: <Anaxagoras> and Democritus and the Stoics say that chance is a cause that is unknown to human reason. For some things are because of necessity, some because of fate, some by choice, some by chance, and some because of spontaneity.
Alexander of Aphrodisias *On Fate* 2 (2.165): Anaxagoras says that none of the things that come into being comes to be by fate but that 'fate' is an empty name.
Scholium on Aristides; Vatic. Gr. 1298: Anaxagoras denies that there is any divine providence for human beings, but says that everything human comes about by chance.

A67

Aëtius 2.8.1: Diogenes and Anaxagoras declared that after the cosmos united and the animals emerged from the earth, it somehow on its own inclined towards its southern part (perhaps because of providence, so that some parts of the world-order might be uninhabited and others inhabited, according to whether the region was chilled, fiery, or mild).

A68

Aristotle *On the Heavens* 4.2 309a19: Some of those who deny the reality of void, for instance, Anaxagoras and Empedocles, did not define light

and heavy at all. ***Physics* 4.6 213a22**: Those who try to show that there is no void do not refute what those men who think there is void really wish to say, but rather they display their own erroneous views, just like Anaxagoras and those who argue in that sort of way. For they point out that air is something, by stretching out wine-skins, showing that air is resistant, and confining it in clepsydras.[27]

A69

[Aristotle] *Problems* 16.8 914b9

As for the phenomena associated with the clepsydra,[28] the cause seems, on the whole, to be just as Anaxagoras says. Air confined in the pipe is the reason why the water does not enter when the pipe has been stopped up; but air is not the cause *simpliciter*, for if someone puts a clepsydra into the water obliquely (having stopped up the tube), the water enters. Therefore Anaxagoras did not satisfactorily explain *how* air is the cause, although it surely is the cause, as has been said.

Now, air naturally tends to move in a straight line, both when it is propelled along and when it moves by itself without being forced, just as the other elements do. So, when the clepsydra is dipped into the water obliquely, the air that is keeping to its straight course is forced out through the holes opposite those in the water by the water that is entering; as the air goes out, the water comes in. But when the clepsydra is dipped straight down into the water, the air is not able to go straight out because the upper parts are closed off, and the air stays put around the first holes. For air is not by nature such as to be able to contract into itself.

What happens to the clepsydra itself is an indication that the air is able to shut out the water by its immovability. For if someone fills the bell of the clepsydra with water, stopping up the tube, and inverting it with the tube downwards, the water does not travel down through the tube towards the mouth. Then, when the mouth *is* opened, the water does not

27 See A69.

28 Here, a *clepsydra* is a vessel used to transfer liquid from one container to another. (Later, the word also comes to be used as the name of the water clock; see A15.) The clepsydra was a common household implement; Empedocles uses it in B100 to explain respiration. There is a good discussion of Empedocles' example in Last, who reports on his own use of a 'water-lifter.' He demonstrates that the water-lifter was undoubtedly what Empedocles has in mind, and argues that 'clepsydra' as water clock is a later use. For discussion and illustrations, see Cohen and Drabkin 326–7, Last 170 (especially fig. 1), or Guthrie's translation of *de Caelo* in the Loeb series (228, esp. (i)). Both Empedocles B100 and this passage from Pseudo-Aristotle stress the gurgling and roaring noises associated with the use of a clepsydra (and Last reports on this as well).

straightaway flow out down the tube, but only a little later, because it is not already at the mouth of the tube, but is moved along the tube later once the mouth of the tube is opened.

When the clepsydra is full and upright and the tube is opened, the water immediately flows straight out through the strainer because it is in contact with the strainer, but is not touching the upper extremities of the tube. The water does not flow into the clepsydra (for the reason just mentioned), but flows out of the opened tube because the air in the tube, being moved up and down, produces strong motion [29] in the water in the clepsydra. Both because it is thrust downwards and because it is itself inclined to flow that way, the water runs out naturally. The water forces itself through the air outside the clepsydra (which is also moving and is equal in power to the air that is thrusting the water along). But the outside air is weaker in resistance than the inside air because when the air inside the clepsydra flows through the narrow tube it flows more quickly and more vigorously and pushes against the water.

The water does not flow down when the tube is covered because the water entering into the clepsydra forcibly pushes the air out of it – the blowing and the belching that occurs is an indication of this. When the water enters, the air is forcibly pushed along, and the water rushes into the tube itself. Just like wedges of wood or bronze pounded in to produce cleavage, the water remains without any other bond, <but whenever> it is driven back from the opposite direction <it springs out easily>, as when they drive out broken pegs in wood. This happens when the tube is opened for the reasons already given.

Therefore, on this explanation, it is reasonable that the water would neither flow out nor discharge as it is prevented by the forceful and effervescent air. The sound makes clear that the water is drawn up by the air (just as happens in many cases). Since all the water, then, is drawn up and continuous with itself, it remains by the pressure of the air, until it is thrust away again by the air. The original part of the water remains, and the rest of the water, since it is one and continuous with the original part, stays suspended.

A70

Theophrastus *On the Senses* 59 (D516): What is rare and fine is hot, while the dense and thick is cold, exactly as Anaxagoras defines aether and air.

29 Reading *κίνησιν*.

A71

Aëtius 2.13.3: Anaxagoras says that the surrounding aether is burning hot by nature, and through the vigour of its whirling around, it snatched up rocks from the earth and, igniting them, has made them stars.

A72

Aëtius 2.20.6: Anaxagoras says that the sun is a mass of red-hot metal or a fiery rock. **2.21.3**: Anaxagoras says that the sun is many times larger than the Peloponnese. **2.23.2**: [On the sun's solstice, or turning.] Anaxagoras says that it is the result of counter-pressure from the air in the north,[30] which the sun itself strengthens by condensation, when it compresses the air.

Scholium on Apollonius of Rhodes 1.5.498: Anaxagoras says that the sun is a mass of burning metal, from which all things come to be.

A73

Xenophon *Memoirs of Socrates* 4.7.6f.: On the whole, Socrates advised against becoming a deep thinker about the way god devises the heavens . . . he said that one who cares about these things risks derangement no less than Anaxagoras, who took the greatest pride in explaining the works of the gods, and lost his own wits. (7) For when Anaxagoras said that fire and the sun are the same, he was ignoring the fact that people gaze easily at fire, but are not able to look straight at the sun, and that when they are exposed to the sun they have darker complexions, but that this is not the case with fire. He also ignored the fact that nothing growing from the earth is able to grow well without the bright light of the sun, but that everything perishes when heated by fire. When he alleged that the sun is a fiery stone he was also ignorant of this: that a stone in fire neither shines nor lasts for long, but that the sun endures for all time as the brightest of all things.

Aristotle *On the Heavens* 1.3 270b24: Anaxagoras has used this word [i.e. *aether*] incorrectly; for he uses *aether* instead of *fire*.

Simplicius *Commentary on Aristotle's On the Heavens* 119.2: Aristotle criticizes Anaxagoras for improperly deriving the word *aether* (αἰθήρ), taking it to be from *aithein* (αἴθειν), which is *to burn*, and so using it instead of *fire*.

30 *Tais arktois*: 'in the north regions'; but the use of the plural perhaps suggests that 'the air at the poles [both north and south?]' is meant here. Hippocrates in *Airs, Waters, Places* 5 uses similar phrasing and clearly means the direction north. For Empedocles' explanation of the solstice, see DK 31A58.

A74

[Aristotle] *Problems* 11.33 903a7: Why is the night a better time for hearing than the day? Perhaps, as Anaxagoras says, because the air, when heated by the sun, hisses and makes noise during the day, but at night it is quiet because the heat has died down.

Plutarch *Convivial Questions* 8.3.3.722a: Anaxagoras says that air that is stirred up by the sun has quivering motions and vibrations. This is obvious from the small bits of dust and particles that are always darting through the light, which some call motes. The man says that because of the heat these things hiss and make noise during the day, making other sounds difficult to hear because of the noise. But at night their motion and noise . . . †[31]

A75

Proclus *Commentary on Plato's Timaeus* 3.63, 36: Plato has taught that their progression into the world-order [i.e., of the sun and moon] was linked.[32] He himself did not originate this hypothesis, but, as Eudemus reported, Anaxagoras was the first to maintain this.

A76

Plato *Cratylus* 409a9–b1: It seems to show that what Anaxagoras recently said, that the moon gets its light from the sun, is rather old-fashioned. **409b5–8**: Now, if what the Anaxagoreans say is true, this light of the moon is always both young and old in a way; for, I suppose, as the sun always goes around in a circle it always casts new light on the moon, but the old light from the previous month is already there. (See also Plutarch, *On the Face in the Moon* 16.7.929 = B18).

A77

Scholium on Apollonius of Rhodes 1.498: This same Anaxagoras declares that the moon is a flat broad place, from which, it is supposed, the Nemean lion had fallen.[33]

31 The text here reads φαίνεσθαι; there is general agreement that this is impossible and that the text is corrupt; DK report the following suggestions for completing the sentence: ὑφίεσθαι (are abated), μαραίνεσθαι (die away), παύεσθαι (cease or leave off).

32 Plato gives linked explanations of the origins of sun and moon.

33 In Plutarch's essay *On the Face in the Moon*, there is a mention of a lion that fell from the moon onto the Peloponnese (937f). Cherniss's note to the passage (in the Loeb

Aëtius 1.25.9: Anaxagoras and Democritus say that the moon is a fiery solid body that has in itself plains, mountains, and ravines.
Achilles *Introduction to Aratus's Phenomena* 21 p. 49.4 M: Others say that the moon is a solid flaming earth that contains fire. There are other habitations there, and there are rivers, and as many things as are on the earth. Legend says that the Nemean Lion fell from there.
Aëtius 2.30.2: Anaxagoras: The moon is unevenly composed, because it is at the same time earthy and mixed with cold; it has heights, lowlands, and hollows. He says that the murky part has been mixed with the fiery, so that the moon seems shadowy; whence it is said to be the star that shines with false light. **2.28.5**: Thales was the first to say that the moon is illuminated by the sun; similarly Pythagoras, Parmenides, Empedocles, Anaxagoras, and Metrodorus said this. **2.29.6, 7**:[34] Thales, Anaxagoras, Plato, and the Stoics are in agreement with the mathematical astronomers that the monthly disappearances of the moon are brought about because it is in conjunction with the sun by which it is illuminated. Eclipses of the moon occur because the moon falls into the shadow of the earth when the earth comes between the two heavenly bodies [i.e., the sun and the moon], or rather when the moon is screened. Anaxagoras, as Theophrastus reports, thinks that an eclipse also occurs when bodies under the moon screen it.

A78

Aëtius 2.16.1: Anaxagoras, Democritus, and Cleanthes say that all the stars move from the east to the west.

A79

Achilles *Introduction to Aratus's Phenomena* 13 p. 40.26 M: Neither Anaxagoras nor Democritus (in the *Great World Order*) suppose that the stars are living beings.

A80

Aristotle *Meteorology* 1.8 345a25: The Anaxagoreans and the Democriteans say that the Milky Way is the light of certain stars. They say that when the sun travels under the earth, it does not shine on some of the stars. Now, the light of stars that are illuminated by the sun is not

edition of Plutarch) says, 'Diogenes Laertius quotes Timaeus to the effect that Heraclides Ponticus spoke of the fall of a man from the moon' (159).

34 The text here is very difficult; for the problems, see DG 53–54.

apparent to us (for that light is blocked by the rays of the sun). The Milky Way is, then, they say, the distinctive light belonging to those stars that the earth screens so that the sun does not shine on them.
Aëtius 3.1.5 (The Milky Way): Anaxagoras says that the shadow of the earth falls on this part of the sky whenever the sun is under the earth and so does not illuminate all of the sky.

A81

Aristotle *Meteorology* 1.6 342b25: Concerning comets: . . . Anaxagoras and Democritus say that comets are the conjunction of planets, whenever they appear to touch each other because they come close.
Aëtius 3.2.2: Anaxagoras and Democritus say that comets are the conjunction of two or more stars so that they shine together.
Scholium on Aratus's *Phenomena* p. 545.20 M: Democritus and Anaxagoras say that comets are formed when two planets approach one another, through the union of their light into one, just as when mirrors reflect each other.

A82

Aëtius 3.2.9: Anaxagoras says that the so-called shooting stars fall away from the aether in the manner of sparks. This is why they are immediately extinguished.

A83

Seneca *Natural Questions* 7.5.3: Again, in that book which he wrote about comets, Charmander says that a great and extraordinary light in the sky the size of a great beam of timber was seen by Anaxagoras and that it shone for many days.

A84

Aristotle *Meteorology* 2.9 369b14: (On lightning and thunder and people who say that lightning is fire in the clouds): Anaxagoras says the fire comes from the upper aether (that is what he calls fire), having descended from above. The gleam of this fire is lightning, and thunder is the noise and the hissing as the fire is quenched. He says that these things occur just as they appear to, and that lightning is prior to thunder.
Aëtius 3.3.4: Anaxagoras says that whenever the hot falls into the cold (this is when part of the aether falls into the airy region), it makes thunder by the noise and lightning by the colour in comparison with the dark of

the cloud-form. Further, it produces the thunderbolt by the extent and intensity of the light, a typhoon by fire composed of many more particles, and the fiery waterspout by fire mingling with clouds.
Seneca *Natural Questions* 2.12.3: On lightning: Anaxagoras says that it is drawn off from the aether and that many sparks fall from so much heat in the sky; the clouds surrounding the sparks retain the heat for some time. **2.19**: On thunder and lightning: Anaxagoras says that these are produced in the following way: some force penetrates the lower regions [of the sky] from the aether in such a manner that when the fire is driven against the cold clouds it makes a noise. Moreover, when the fire breaks up the clouds it flashes; a lesser force of fire makes lightning and a greater force makes lightning bolts.

A85

Aëtius 3.4.2: Anaxagoras explains clouds and snow in nearly the same way as Anaximenes (cf. Anaximenes A17), but Anaxagoras says that hail is produced whenever water droplets are pushed towards the earth from frozen clouds, are chilled, and become round by their descent.
Aristotle *Meteorology* 1.12 348b13: Anaxagoras says that hail forms whenever a cloud ascends into the cold air; but we say that hail forms whenever a cloud descends into hot air. **348a14**: It seems to some that the cause and the origin of hail is this: When a cloud is pushed into the upper region, which is colder because there the reflections of the rays of the sun from the earth cease, the water freezes once it arrives there. For this reason, they think that hailstorms occur more often in summer and in hot places, because the greater heat pushes the clouds higher up from the earth. [According to Alexander of Aphrodisias, Aristotle is thinking of Anaxagoras here; see Alexander's *Commentary on Aristotle's Meteorology* 49.13.]

A86

Aëtius 3.5.11: Anaxagoras says that the rainbow is a reflection of the sun's radiance by a dense cloud, and that it is always placed right opposite the star [the sun] that it is reflecting. The so-called mock suns that occur in the region of the Black Sea are explained in nearly the same way.

A86a

Scholium on Aeschylus *Prometheus Bound* 88: According to Anaxagoras, the winds come from the earth, and according to Homer, 'from the clouds of Father Zeus' [*Iliad* 2.146]. Anaxagoras gives the material cause of the

winds, and Homer gives the efficient cause, or, rather, he gives both the material and the efficient causes.

A87

Excerpt from Astronomical Codex Vatic. 381 [ed. Maass Aratea p. 143]: The earth is neither concave, as Democritus says, nor flat, as Anaxagoras says.

Aristotle *On the Heavens* 2.13 294b14: Anaximenes, Anaxagoras, and Democritus say that the flatness of the earth is the cause of its remaining at rest. For, they say, it does not cut the air underneath it but covers it like a lid just as flat bodies appear to do. For, because of their resistance, they are difficult to move, even by the wind. This same immobility, they say, is produced by the flatness of the earth with respect to the underlying air, which, lacking enough room to do so, does not change its place (and remains resting on the compressed air beneath it), just as the water in a clepsydra does. They produce much evidence that the air, when it is cut off and resting, is able to bear a great weight. Now, first, if the shape of the earth is not flat, the earth cannot be at rest because of its flatness. Indeed, their own evidence does not attribute the immobility to the earth's flatness, but rather to its size.

Martianus Capella *The Marriage of Mercury and Philology* 6 590–92: (590) The overall shape of the earth is not flat, as those presume who suppose that it is like an extended disc; nor is it concave, as others suppose who declare that the rain falls into the lap of the earth; but it is rounded, and even spherical, as Dicaearchus asserts. (591) For, if the works of the heavens were spread over an extended flat surface, [the times of] the rising and setting of the stars would not change with the elevation or position on the earth, and the stars would glitter over the earth and seas at one and the same time (unless the appearance of the rising sun were concealed from the recesses of hollowed cavities in the more remote parts of the earth). (592) Since, on the contrary, this latter claim is a contemptible and empty conjecture, it is good that we examine the first suggestion, to which even the natural philosopher Anaxagoras acceded (even though he is thought to have presented *some* arguments for it). In fact, he said that the flatness of the earth is clearly established by the rising and setting of the sun or moon: as soon as the flash of first light shines forth, it is immediately directed to our gaze in straight lines. The proof of this is more clearly obvious, he claimed, if we move away from the obstructing mountains, and position ourselves on the seashore. But, if this were true, the rising sun would be perceived by inhabitants in all lands at the same

time, and the setting of the sun would be able to darken all lands at once.

A88

Aristotle *On the Heavens* 2.13 295a9: So that if it is by constraint that the earth now stays where it is, then it was carried by the whirl and came together at the centre; for everyone says that this is the cause, because of what occurs in water and in the air. For, in those, the larger and heavier bodies are always moved towards the centre of the whirl. So this is why all those who generate the heavens say that the earth came together in the centre.
Simplicius *Commentary on Aristotle's On the Heavens* 511.23: Most say that the earth lies at the centre, as, for instance, Empedocles and Anaxagoras ... **520.28**: Third, Aristotle discusses those who say that the earth remains where it is because it is supported by the underlying air. The earth, because it is flat and drum-shaped, covers the air like a lid and does not allow it to escape. Anaximenes, Anaxagoras, and Democritus seemed to say this.

A89

Aristotle *Meteorology* 2.7 365a14ff.: On earthquakes and movements of the earth ... (a19) ... Anaxagoras says that aether naturally moves upwards, and, when it is trapped in the hollow places under the earth, it moves the earth; for the top surfaces have been clogged up by rain, since all of it is equally porous by nature. It is as though the whole sphere has an up and a down, and the up is that portion on which we happen to live, and the down is the other ... (a31) It is simple-minded to say both that the earth rests on the air because of its size and also that a blow upwards from below shakes the whole earth. Moreover, Anaxagoras says nothing of the circumstances under which earthquakes occur.
Aëtius 3.15.4 (on earthquakes): Anaxagoras says that earthquakes occur because the air that gets under the earth strikes against the thickness of the surface of the earth. Then, because it is not able to make its escape from there, it shakes its surroundings by quaking.
Seneca *Natural Questions* 6.9.1: Some are of the opinion that fire is the cause of the motion of the earth in earthquakes, but others do not think that there is a unique cause. It is principally Anaxagoras who reckoned that the earth is shaken for roughly the same reason that atmospheric air is, namely, moving air in the lower region ruptures air which is dense and collected into clouds (with the same force with which little clouds are

usually broken up). Fire is emitted by this collision of clouds and from the force of the escaping air. Seeking an exit, the fire runs against whatever it meets and breaks up anything that resists it, until it either finds a way of escaping to the sky through a narrow passage or makes one, by force and destruction.

Ammianus Marcellinus 17.7.11: [Earthquakes] occur ... either in the small cavities in the earth, which in Greek we call a *syrinx* [pipe], because of the combined pressure of the surging water, or at any rate (as Anaxagoras says) by the force of winds entering into the underside of the earth. When they strike the solidly encrusted parts and find no way of breaking out, they rapidly shake those parts of the surface under which they crept when they were swollen. This is why it is usually observed that when there are earthquakes, we do not sense any winds at all, because they are contained in the furthest reaches of the earth.

A90

Aëtius 3.16.2: On the sea: how it formed and why it is bitter. Anaxagoras says that in the beginning, after the marshy water was burned by the revolutions of the sun and after the very rare moisture evaporated, the remainder that settled out was salt and bitterness.[35] (See also Hippocrates *Airs, Waters, Places* 8 for a discussion of the role of the sun in producing brackish water; Anaxagoras is not mentioned in that passage.)

Alexander of Aphrodisias *Commentary on Aristotle's Meteorology* 67.17: The third view about the sea is that the water that is percolated through the earth and washes it becomes brackish because the earth has these sorts of flavours in itself. They gave as evidence of this that both salt and carbonate of soda are mined from the earth; and that in many places the earth has sour flavours. Again, both Anaxagoras and Metrodorus held this view.

Arabic translation of Galen's *Commentary on Hippocrates, Epidemics Book II* (Paris, BnF, MS fonds arabe 2846, fol. 30a4–9; Madrid, Escorial, MS ar. 804, fol. 55b17–21):[36]

وأناكساغورس[37] يسمي هذا الطعم بورقيا من اسم البورق لأن البورق أيضا مالح[38]

35 See A1 (8).

36 For this entry, DK printed F. Pfaff's German rendering of the unpublished Arabic text from *In Hippocratis Epidemiarum Librum II Commentarii Corpus Medicorum Graecorum* vol. 10, 1 (Leipzig, 1934). Dr Peter Pormann examined and collated manuscripts in Paris and Madrid and provided the Arabic text printed here; Dr Pormann also translated the passage and supplied notes 37–43. I am grateful for his help.

37 coni.; codices: ورلساعورس, وركساعورس, لاكساغرس.

38 مالح] P; E: ملح.

ويقول في هذا الطعم أنه يتولد من الحرارة إلا أن تلك الحرارة المولدة له ليست بمفرطة قوية كالحرارة التي تولد المرارة وفي ذلك دليل على أنهم لم يصيبوا في تسميتهم هذا الطعم بورقيا لأن المرارة في البورق أغلب من الملوحة فالذي يسمى هذا الطعم بالاسم الذي هو أولى به هو[39] أبقراط وأفلاطن[40] فإن أبقراط يسميه الملحي وأفلاطن[41] يسميه المالح.

Anaxagoras calls this taste [that of salty water] natron-like [*bauraqī*], from the word natron [*bauraq*], since natron too is salty [māliḥ].[42] He says about this taste that it[43] is generated [*tawallada*, lit. 'comes-to-be' *γίγνεται*] by heat [*ḥarāra*]. This heat, however, that generates it is neither excessive [*mufraṭ*] nor strong like the heat that generates bitterness [*marāra*]. In this there is a proof that they [those using the term natron-like] did not hit the mark, when they called this taste 'natron-like,' for bitterness is more dominant in natron than saltiness [*mulūḥa*]. Those who called this taste by a name that is more appropriate are Plato and Hippocrates, for Hippocrates calls it 'salt-like [*milḥī*, *ἁλώδης*]' and Plato 'salty [*māliḥ*, *ἁλμυρός*].'

A91

Aëtius 4.1.3 (On the sources of the Nile): Anaxagoras says [the Nile flows] from the snow in Ethiopia that melts in the summer, but remains frozen in the winter.

Aristotle (Rose fragment 248) [on the Nile]: Anaxagoras of Clazomenae, son of Hegesibulus, says that the river is swollen in summer because snow has melted.

Seneca *Natural Questions* 4a.2.17: Anaxagoras says that melted snow runs down from mountain ranges in Ethiopia all the way to the Nile. Every ancient authority held the same view. Aeschylus [*Suppliant Maidens* 559, fragment 300], Sophocles [fragment 797], and Euripides [*Helen* 3 and fragment 288] say this. But it is clear, on the basis of many arguments, that this is false.

39 هو] sic in P et in margine E; om. E.
40 وأفلاطن] E; P: وأفلاطون.
41 وأفلاطن] E; P: وأفلاطون.
42 Thus in P; E reads 'salt (*milḥ*),' adopted by Pfaff (*ein Salz*).
43 Pfaff translates *wa-yaqūlu fī hādā ṭ-ta'mi annahū* ('He says about this taste that it . . .') as 'Und Hippokrates sagt von diesem Geschmack, daß er . . .' This change in subject is not, however, indicated in the Arabic.

Herodotus *Histories* **2.22**: And the third view is by far the most persuasive, but it is the most mistaken. For this explanation is false, since it claims that the Nile flows from melting snow ...

A92

Theophrastus ***On the Senses* 27ff.** (D.507): Anaxagoras says that perception occurs through opposites, for the similar is unaffected by the similar. He attempts to distinguish each [sense] by its own character. Sight occurs through a reflection in the pupil of the eye; there is no reflection in something of the same colour, but rather in what is of a different colour. Now in many animals, the difference in colour occurs during the day, but for some it is at night, so they are sharp-sighted then. Generally, night has the same degree of darkness as the eyes. Reflection occurs in the day, because light is a contributing cause of reflection. Strong colours are always more strongly reflected in their opposite. (28) Touch and taste make distinctions in the same way: something that is hot and cold to the same degree neither heats nor cools when it is near something else, nor do we recognize sweet and bitter by these qualities themselves, but cold is perceived by hot, fresh by brackish, sweet by bitter, according to the deficiency of each (for he says that all things are already present in us). It is the same for smell and hearing: the one operates by inhalation, the other through the penetration of sound far into the brain (the surrounding bone is hollow, and the sound penetrates into it). (29) All perception is accompanied by pain. This would seem to be a consequence of his hypothesis, for everything that is unlike produces irritation when it is touched. This is clear in perception over long periods of time and at excessive levels. For bright colours and very loud noises cause pain and one is not able to stand them long. Larger animals perceive more and in general perception is proportional to the size <of the sense organs>. Those animals that have large, clear, bright eyes see large and distant things; it is just the opposite for those with small eyes. It is the same for hearing. (30) Large animals hear large and distant perceptibles, while the smaller ones elude them, and small animals hear small and near perceptibles. It is also the same for smell: thin air has more odour, since air takes on an odour when heated and rarified. When a large animal inhales, it breathes in both the rare and the dense, but a small animal draws in the rare by itself; and therefore the large animals perceive more. For scent is stronger when it is near rather than far away because it is denser; when dispersed, it is weaker. One might even say that the large animals do not perceive rare air, while the small ones do not perceive the dense ... (37) Anaxagoras then, as was

said, maintains this sort of common and old-fashioned belief. Except that he says something of his own about each individual sense and especially concerning sight, because he says that size is perceptible, he is not clear on the more tactile senses ... (59) Anaxagoras spoke superficially about colours.

A93

Aëtius 4.3.2 Is the soul a body and what is it?: Anaximenes, Anaxagoras, Archelaus, and Diogenes say that it is like air. **4.5.11**: about the *hegemonikon* (the ruling part of the soul): Pythagoras and Anaxagoras ... say that *Nous* enters in from without. **4.7.1**: Pythagoras, Anaxagoras, and Diogenes asserted that soul is indestructible. **4.9.6**: Parmenides, Empedocles, Anaxagoras, Democritus, Epicurus, and Heracleides hold that each of the various sensations occur because of the symmetry of pores, with each of the appropriate objects of sensation fitting in each perceptual pathway.

A94

Aristotle *Nicomachean Ethics* 7.15 1154b7: An animal is always in distress, as the natural philosophers also testify when they claim that seeing and hearing are painful.
Aspasius: *Commentary on Aristotle's* Nicomachean Ethics 156.14: Anaxagoras said that an animal is always in distress because it perceives. But Aristotle says these things, not because he agrees with them, but because he is reporting them, since it did not in truth seem to Aristotle and Theophrastus that a living thing is always in some distress. In his *Ethics* Aristotle criticizes Anaxagoras, as does Theophrastus, saying that pleasure drives out pain – at least the opposing pleasure does so ...
Aëtius 4.9.16: Anaxagoras says that all perception is accompanied by distress.

A95

Cicero *Academica Post.* 1.12.44: Arcesilaus took every argument upon himself, not out of obstinacy or zeal for victory but because of the uncertainty of those matters that had led Socrates to a confession of ignorance and – even before Socrates – Democritus, Anaxagoras, Empedocles, and nearly all those ancients who said that nothing can be cognized, nothing perceived, nothing known. They said that the senses are limited, minds are feeble, the span of life is short, and that, as Democritus says, truth is submerged in the depths [68B117], all things are held as opinion and

custom, there is no room left for truth, and all things are enveloped in darkness.

A96

Aëtius 4.9.1: On whether the senses are truthful: Pythagoras, Empedocles, Xenophanes, Parmenides, Zeno, Melissus, Anaxagoras, Democritus, Metrodorus, Protagoras, and Plato say that the senses are deceptive.

A97

Sextus Empiricus *Outlines of Pyrrhonism* 1.33: We set what is thought in opposition to what appears, as Anaxagoras set the appearance that snow is white in opposition to the claim that snow is frozen water, water is black, and therefore snow is black.

Cicero *Academica Pr.* 2.31.100: It would be easier for him to prove that snow is white than it was for Anaxagoras, who denied not only that it was, but also that it even seemed to him to be white, since he knew that water is black and that snow is solidified from it.

A98

Scholium on Homer *Iliad* 16.161: Black water: Anaxagoras says it is black by nature; and, at any rate, black smoke is produced from the water in logs.[44]

A98a

Psellus *On Stones* 26: Many were confident that they had given the causes of the properties of stones; among the older wise men there were Anaxagoras, Empedocles, and Democritus . . .

A99

Aristotle *On the Soul* 1.2 404a25: Similarly, Anaxagoras (and anyone else who has said that mind [*Nous*] moved the whole) says that the moving cause is soul.

A100

Aristotle *On the Soul* 1.2 404b1: Anaxagoras is less clear about mind (*nous*) and soul (*psychē*); for he often says that mind (*nous*) is the cause of the

44 Note that green (i.e., wet) wood produces black smoke.

fine and the right, but elsewhere he says that this is soul. For he says that *nous* belongs to all animals, both the great and the small and the worthy and the less worthy. But mind (in the sense of practical intelligence [*phronēsis*]) does not appear to belong equally to all animals, nor even to all human beings. **405a13**: Anaxagoras seems to say that soul (*psychē*) and mind (*nous*) are different; ... but he uses the two as though they were one in nature, except that it is *nous* that he regards primarily as the principle. At any rate, he says that it alone of the things that are is simple and unmixed and pure [B12]. He gives both knowledge and movement to the same principle, since he says that *nous* moves the whole. **405b19**: Anaxagoras alone says that *nous* is impassible and has nothing in common with anything else. **3.4 429a18**: It is necessary then, since Mind thinks all things, that it be unmixed just as Anaxagoras says [B12], in order that it may rule, that is, in order that it may know.

A101

Aëtius 5.20.3: Anaxagoras says that all living things have active [productive] reason (*logos*), but that they do not have the receptive mind, the so-called interpreter of *nous*.[45]

A101a

Psellus *Miscellany* 15: Anaxagoras does not assign *nous* in the sense of practical wisdom to all human beings; not because they do not have *nous* in them, but because they do not always use it. Soul (*psychē*) is characterized in two ways: as mover and as knower.

A102

Aristotle *On the Parts of Animals* 4.10 687a7: Anaxagoras says that man is the most intelligent of the animals because he has hands; but it would be better to say he has hands because he is the most intelligent. For the hands are a tool, and nature always distributes each tool to the animal that is able to use it, just as an intelligent man would. [Galen repeats Anaxagoras' claim and Aristotle's response at *On the functions of the parts of the body* 1.3.]

Plutarch *On Fortune* 3.98f.: in all these [physical skills that animals possess] we are more unfortunate than the beasts, but by experience and memory and wisdom and art according to Anaxagoras, we make use of their activity [?] and take their honey and milk them and herding them

45 Text as in DK, who remark that the text as given is 'unintelligible.'

together, use them as we will. There is nothing of chance here, but all is wisdom and forethought.[46]

A103

Aëtius 5.25.2: Anaxagoras says that sleep is produced by weariness from bodily activity; for it is an affection of the body, not one of soul. Death is the separation of soul [from the body].

A104

Galen *On the natural faculties* 2.8: For if it is correct to raise *this* question [about the nature of bile], why do we not *also* investigate blood: is its origin in the body or it is intermingled with foods, as those who posit the homogeneous stuffs claim?

A105

Aristotle *On the Parts of Animals* 4.2 677a5: Anaxagoras and his followers are wrong to suppose that the gall bladder is the cause of acute diseases because it spurts out on the lung, the veins, and the ribs when it is over-full. For, as would become obvious in dissections, those who have these diseases almost always do not have a gall bladder.

A106

Aëtius 4.19.5: Anaxagoras says that sound occurs when blowing air collides with stable air; it recoils from the impact until it reaches the ears. What is called an echo also occurs this way.

A107

Aristotle *On the Generation of Animals* 4.1 763b30: Some, such as Anaxagoras and others of the natural philosophers, say that the opposition is already in the sperm. For the sperm comes from the male, while the female provides the place, and the male is from the right parts and the female from the left parts of the father, and males are in the right side of the uterus, the females in the left.

46 Plutarch is in the midst of comparing humans with animals. Although animals have much greater physical and perceptual abilities, human beings can master them through the use of 'experience and memory and wisdom and art.' The phrase in quotation marks was given by Diels as B21b. Following other scholars, I have placed the passage in the testimonia. There are textual problems here; I read σφῶν τι instead of τε; ἔργῳ is uncertain.

Censorinus *On Birthdays* 5.2: But some reject this view [that semen is formed in the marrow], for instance, Anaxagoras, Democritus, and Alcmaeon of Croton. They say that after strenuous activity, not only the marrow but also the fat and much of the flesh is reduced. There is also disagreement whether offspring are produced from paternal seed alone, as Diogenes, Hippon, and the Stoics write, or also maternal seed, as is maintained by Anaxagoras and Alcmaeon, also by Parmenides, Empedocles, and Epicurus.

A108

Censorinus *On Birthdays* 6.1 [On what is formed first in an infant]: Anaxagoras says: the brain, from which all the senses arise.

A109

Censorinus *On Birthdays* 6.2: There are those who, following Anaxagoras, think that aetherial heat in the semen orders the limbs.

A110

Censorinus *On Birthdays* 6.3: It seems to Anaxagoras, as to many others, that food is administered through the umbilical cord.

A111

Aëtius 5.7.4: Anaxagoras and Parmenides say that the sperm coming from the right side is deposited into the mother's right side, that from the left into the left. But if the discharges are changed around, females are produced.
Censorinus *On Birthdays* 6.6: Anaxagoras and Empedocles agree that males are produced by semen coming from the right testicle, and females from the left. Although they concur in this, their opinions divide on the question of the resemblance of offspring to their parents. **6.8**: Anaxagoras concluded that children resemble that parent who had bestowed the greater amount of seed.

A112

Aëtius 5.19.23: The Epicureans . . . say that living things come to be by means of change in each other, for they, too, are parts of the world-order (*kosmos*); according to both Anaxagoras and Euripides, 'not one of the things that come to be dies, but separating off from one another, they

exhibit different form.' Cf. Euripides *Chrysippus* fr. 839:

Greatest Earth and aether of Zeus,
he, progenitor of men and gods,
she, receiving moistening drops of rain,
gives birth to mortals,
gives birth to food and to the tribes of beasts,
whence not unjustly
she is considered the mother of all.
The things grown from the earth return
to the earth,
The buds from the aetherial seed
Return to the heavenly vault.
Not one of the things that come to be dies,
But separating off from one another,
They exhibit different form.

A113

Irenaeus *Against Heresies* 2.14.2: Anaxagoras, who has also been called an atheist, propounded as dogma that animals are made by seeds falling to the earth from the sky.

A114

Aristotle *On the Generation of Animals* 3.6 756b13: There are some who say that the raven and the ibis copulate through the mouth, and that among the quadrupeds the weasel gives birth through the mouth. Anaxagoras and some others of the natural philosophers claim this, but they speak altogether too superficially and credulously.

A115

Aristotle *On Breath* 2 470b30 [On respiration in lungless animals]: Anaxagoras and Diogenes, who hold that all animals breathe, say that fishes and oysters breathe in a fashion. Anaxagoras, for instance, says that when fish bring in water through their gills, air is generated in the mouth, and the fish draw this in and breathe, for there is no void.

A116

Plutarch *Natural Questions* 1.911d: The Platonists, Anaxagoreans, and the Democriteans suppose that a plant is an earth-bound animal.

A117

Theophrastus *On Plants* 3.1.4: Anaxagoras maintains that the air contains seeds of all things and that these seeds, carried down together in rain, generate plants. [Theophrastus mentions this view again at *On the Causes of Plants* 1.5.2; Varro repeats the claim at *On Farming* 1.40.1, and indicates that it comes from Theophrastus' reports]

[Aristotle] *On Plants* 1.1 815a15: Anaxagoras and Empedocles say that plants are moved by desire and they also assert that they sense and can be made sad and happy. Anaxagoras said that they are animals and feel joy and sadness, taking the fall of their leaves as evidence . . . **815b16**: Anaxagoras and Democritus and Empedocles used to say that plants have intellect and intelligence. **816b26**: Anaxagoras said that a plant has respiration. **817a23**: The source of food for plants is the earth and the source of the generation of fruits is the sun. For this reason Anaxagoras said that their coolness derives from the air and [Alcmaeon] said that earth is the mother and the sun is the father of plants.[47]

47 This text follows DK, except for the following: The crux in the text, *lechinoeon*, is almost certainly a corruption of 'Alcmaeon.' See A. Lebedev, 'Alcmaeon on Plants: A New Fragment in Nicolaus Damascenus,' *La Parola del Passato* 48 (1993) 456–60, anticipated by G. Kirk, 'A Passage in *De Plantis*,' *Classical Review* NS 6 (1956), 5–6.

PART THREE

Essays

1

Anaxagoras's Life and Work

Asked, 'Have you no care for your country?' Anaxagoras pointed to the heavens and replied, 'Hush, I am very concerned about my country.' (A1)

Anaxagoras of Clazomenae, son of Hegesibulus, was the first Presocratic philosopher to settle in Athens. Clement of Alexandria reports that Anaxagoras brought Milesian teaching from Ionia to Athens (A7); it is possible that he was teaching in the city before the arrival of the Sophists.[1] Although Anaxagoras apparently came from a landed family, he is reported to have left his fields untended, preferring to spend his time doing philosophy; he is also reported to have given away his land, perhaps when he moved to Athens. After becoming an associate of Pericles (who died in 429 BC), and spending a long time in the city (the reports range from twenty to thirty years), Anaxagoras was accused of impiety, tried, and left the city (he may have been banished as some reports say, or perhaps he felt it prudent to withdraw). He ended his days in Lampsacus in the northern Hellespont, where, it is said, the citizens gave him an honourable burial and

1 Clazomenae is on the west coast of what is now Turkey, north of Ephesus. There is some confusion about the name of Anaxagoras's father: Diogenes Laertius (A1) says that he was the son of Hegesibulus or of Eubulus. In his report about the taking of Ionian views to Athens, Clement is following accounts that link Anaximenes and Anaxagoras as teacher and pupil. This is chronologically unlikely; Anaximenes' probable dates are too early for him to have been Anaxagoras's teacher, although some of his views may have influenced Anaxagoras. We do not know when in the fifth century Anaxagoras came to Athens nor do we know the nature of his philosophizing there (whether he had a school, for instance). The fullest biographical report (although not necessarily the most accurate) is in Diogenes Laertius; see A1.

erected a memorial inscription to him. There is general agreement that Anaxagoras was born about 500 BC (the report in Diogenes Laertius says that he was twenty 'at the time of Xerxes' invasion' – that is, in 480 BC), and lived for about seventy years (Diogenes Laertius, following Apollodorus, says seventy-two). Thus, he belongs to the generation of Greek thinkers of the fifth century who succeeded Parmenides and preceded Socrates and Democritus. This essay explores Anaxagoras's biography, his intellectual background, and his influence on later philosophers. These discussions will introduce some of Anaxagoras's theories, and these will receive fuller treatment in the Essays that follow. In addition, this Essay focuses on problems in interpreting later reports about Anaxagoras and his views.

1.1 Anaxagoras's Life

Few details of Anaxagoras's life are certain. The doxographic writings concerning the publication of his book, his arrival in Athens, what he did there, and when (and under what circumstances) he left the city, are both confused and confusing.[2] In addition, many stories about Anaxagoras or reports of his sayings are almost certainly apocryphal; either they illustrate certain of his philosophical views, or they attribute to him the typical otherworldliness of philosophers and the sagacity of one who understands the heavens and their workings.[3] The ancient Greek chroniclers and biographers were not obsessed with historical accuracy (and specific information on dates and events in a philosopher's life were, after all, hard to come by); rather, they were keen to tell a good story, link famous people with the dates of important events, and provide successions (particularly of the teacher-pupil variety). The typical biography assumes that a famous person reached his 'acme' in his fortieth year (this is particularly true of the dates calculated by Apollodorus), and calculates birth and death dates from that year, also attempting to link the famous man with a momentous event at some time in his life (hence, perhaps, the claim that Anaxagoras was

2 The standard English-language histories of Presocratic philosophy (Guthrie in *History*, KRS, Barnes in *Presocratic*) provide treatments of the biographical testimonies; all reach different conclusions. Sider (*Fragments*) gives a judicious survey of the evidence; very detailed discussions can be found in Mansfeld ('Chronology') and in Woodbury. Both have careful and exhaustive treatments of both the ancient evidence and modern literature (with full references for those who wish to pursue the topic further); they reach quite different conclusions about Anaxagoras' arrival in, stay in, and departure from Athens.

3 Recall the similar stories told about Thales: there are tales both that he fell down a well while stargazing (Plato *Theaetetus* 174a4–b1) and that he made a fortune by using his meteorological knowledge to predict a bumper olive crop (Aristotle *Politics* 1259a6–19).

twenty when Xerxes invaded Greece).[4] The information that has reached us has gone through a number of sources, with later writers such as Diogenes Laertius (ca 200 AD), Hippolytus of Rome (ca 200 AD), and Eusebius (ca 260–340 AD) relying on earlier historians and chroniclers such as Stesimbrotus, who worked in Athens in the late fifth century BC; and Apollodorus of Athens (ca 150 BC), who himself relied on earlier writers.[5] Anaxagoras was particularly interesting to the chroniclers of Athens because of his reported connections with Themistocles and Pericles. Stories about him turn up in these sources in the context of accounts of the great men, but such writers were not necessarily concerned with his philosophical views or even with historical accuracy. Fortunately for students of ancient Greek philosophy, most of these confusions and inconsistencies do not seriously affect our understanding of Anaxagoras's philosophical views.

Anaxagoras was philosophizing in Athens by the middle of the fifth century. Jaap Mansfeld has suggested the following chronology, based on Diogenes Laertius' text. Anaxagoras was twenty at the time of Xerxes' invasion. He came to Athens and 'began to philosophize' in 456/5 BC when Callias was archon, staying there twenty years (Diogenes Laertius also reports that some say thirty).[6] Mansfeld argues for a publication date for Anaxagoras' book of about 440 BC, and states that 437/6 is probably correct as the time of Anaxagoras's trial and departure from Athens (the date given by both Apollodorus and Demetrius of Phaleron).[7] This gives Anaxagoras almost ten years in Lampsacus, time enough for him to become the much-revered public figure that the stories told about him would suggest.

4 Of course, Anaxagoras might indeed have been twenty that year. Woodbury argues for a chronology that connects Anaxagoras's arrival in Athens with the Persian invasion; he argues that this would explain reports that Anaxagoras was connected with Themistocles (who died in 450 BC) and reports that Anaxagoras was charged with Medism (support for the Persians) at his trial.

5 Many of these works survive only as reports or fragments preserved in other writers, and there are internal inconsistencies and problems with texts, as well as discrepancies between reports by various writers. For discussions of the reliability of various sources and attempts to untangle the ancient evidence see Mansfeld ('Chronology'), O'Brien ('Relation'), and Woodbury.

6 Mansfeld ('Chronology') posits a short lacuna in Diogenes Laertius's text to indicate the stay of twenty years. He argues that the dates ultimately come from Demetrius of Phaleron and Apollodorus (whose *Chronicles* are used extensively by Diogenes Laertius), and fit Apollodorus's overall pattern of important dates and links between famous Athenians (or visitors to Athens).

7 Mansfeld's chronology is accepted by Schofield in his *Routledge Encyclopedia* article. It is rejected by Woodbury and Sider (*Fragments*), both of whom argue for an earlier appearance in, and departure from, Athens. We should recall that 'publication' was much less formal in the ancient world than it is in the modern.

Anaxagoras enjoyed a certain degree of fame (or notoriety) in the ancient world. About 467 BC a large rock fell from the sky at Aegospotami;[8] later chroniclers link Anaxagoras's name with the fall – often saying that he predicted it (see A1 (10), A6, A10, A11, A12). In his book he offered explanations for meteors and comets; his view was that the stars and other heavenly bodies are whirling red-hot stones snatched up from the earth and held in place by the cosmic whirl. Plutarch (A12) explicitly links the stories about the prediction with Anaxagoras's scientific explanations, saying that because of slipping or shaking, heavenly bodies could indeed fall from the sky.[9] Plutarch also notes that Daimachus reported that there was a comet blazing in the sky for seventy-five nights before the meteorite fell.[10] Anaxagoras's view that the celestial bodies are blazing stones and the sun a fiery mass of red-hot metal was notorious; reportedly it was this account of the heavenly bodies that resulted in the charges of impiety (although there may well have been political motives as well, just as there were in Socrates' later trial on similar charges).[11] While in Athens, Anaxagoras was connected with both the political and intellectual elite. The friendship with Pericles seems well established, and there are reports of an association with Themistocles (although chronological difficulties affect this claim).[12] Some have seen evidence of Anaxagoras' teachings in the plays of Aeschylus, and in the ancient world it was said that Euripides was his pupil, with echoes of Anaxagoras being found in his works as well.[13]

8 'Aegospotami' ('Goat River') is the name of both a town and a river in the Thracian Chersonnese.

9 In the testimonia, other sorts of predictions are linked with Anaxagoras's name; for instance, foretelling showers in the dry season at Olympia (A1 and A6). Hippolytus ends his discussion of Anaxagoras with the claim: 'They say also that he was a prognosticator' (A42).

10 Although some meteorite showers are now predictable, the fall of a particular meteorite at a particular place and time could not have been predicted by Anaxagoras. Moreover, meteorites are not derived from comets, although the reported coincidence of the two phenomena may have lent credence to stories about Anaxagoras' prediction.

11 In *Clouds*, Aristophanes satirizes the new learning of the Sophists and the physicists (such as Anaxagoras). In Plato's *Apology*, Socrates refers to Aristophanes' comedy and accuses Meletus of trying to link his views with those of Anaxagoras (see A35).

12 Again, for full discussions, see Mansfeld ('Chronology') and Woodbury.

13 As evidence of Anaxagoras's influence on Aeschylus, scholars cite the *Eumenides* (657–66), the *Supplices* (559–61), and Fr. 300, where notions that are also found in Anaxagoras occur. (For discussions of the possibility of influence, see Rössler.) If Mansfeld is right about the chronology, and if the hypothesis of influence is correct, then Aeschylus must have known Anaxagoras's work before Anaxagoras arrived in Athens. Mansfeld notes that the material in Aeschylus may not have come from Anaxagoras, and, in any case, it does not imply that Aeschylus got the information

The relation of Anaxagoras to his philosophical contemporaries remains mysterious. The most perplexing (and frustrating) questions involve the chronological relation of Anaxagoras to Empedocles and to Zeno, and the question of whether or not Socrates and Anaxagoras ever met. Aristotle gives us intriguing information in the *Metaphysics* (A43): 'Anaxagoras of Clazomenae, *proteros* than Empedocles in age, but *husteros* in his work, says that the principles are unlimited.' Unfortunately, Aristotle's comment is ambiguous. The two Greek words would normally be taken to mean, on the one hand, 'prior' or 'earlier' (*proteros*) and, on the other, 'later' (*husteros*); Aristotle might be saying that although Anaxagoras was older than Empedocles his work was published after Empedocles'. Others, including Alexander of Aphrodisias, in his commentary on the *Metaphysics*, interpret Aristotle as saying that Anaxagoras's work was inferior (a possible meaning of *husteros*).[14] I take the two words to be parallel, and temporal in sense.[15] Anaxagoras and Empedocles were probably active at about the same time, and both were clearly working within a Parmenidean framework. Anaxagoras' work is more straightforwardly metaphysical and cosmological than Empedocles' (which has religious and ethical strains peculiar to Empedocles himself). If, as is possible, Anaxagoras was working

directly from Anaxagoras or from an already published book. See Mansfeld 'Chronology' and his review of Schofield for further elaboration. The ancient historians were always happy to find teacher–pupil relations; the presence of material that sounds Anaxagorean in Euripides should not be taken to imply any formal relation between them. O'Brien ('Relation') discusses in detail the possibility of Anaxagoras's influence on Empedocles.

14 Alexander, *in Met*. 27–28; esp. 28.2–3. Aristotle indeed seems to have preferred Empedocles' theories to those of Anaxagoras. The most forceful contemporary proponent of this interpretation of ὕστερος is O'Brien, in 'Relation,' who also argues that Anaxagoras influenced Empedocles, relying particularly on theories of vision (see his 'Derived Light'). Claims of influence are extremely difficult to prove; see Mansfeld's response to O'Brien in 'Chronology.' Without some argument about influence, the passage does not support a claim of temporal priority for Anaxagoras, for Aristotle could certainly have thought that Anaxagoras was both later in time and an inferior philosopher. Ross, in his commentary on the *Metaphysics*, follows Alexander's understanding, but concedes that 'it is quite possible to take ὕστερος in its literal sense' (1:132).

15 Even if Aristotle is claiming that Anaxagoras's work became known later than Empedocles', Anaxagoras could well have begun philosophizing before Empedocles. I originally took Anaxagoras's work to have preceded Empedocles' (in *Legacy*), but took no stand on the question of influence; it now seems to me better to take Aristotle's claim here in the more straightforward temporal sense. In *Met*. 1, Aristotle is canvassing his predecessors' views about causes; in this passage he seems to be explaining why, even though Anaxagoras was older than Empedocles, he mentions Anaxagoras *after* Empedocles. The interpretation I give here takes the two adjectives to be parallel; this is, I now think, the most natural reading of both the grammar and Aristotle's comment.

as a philosopher for some years before his book was published, his views could have become known to other philosophers, thus accounting for possible traces of influence. Zenonian influence (or responses to Zeno) have been seen in Anaxagoras's views on unlimited smallness, particularly in B3, B5, and B6.[16] There are no extant ancient testimonia that link the work of Anaxagoras and Zeno, and so the arguments must be made on the basis of internal evidence from the fragments themselves.[17] Anaxagoras was interested in the unlimited (*apeiron*, also translated as indefinite, or infinite), particularly with respect to size and manifestness (see Essay 3). But his interest is rather far from Zeno's explorations of the mathematical notion of infinity and the problems of reconciling logical and mathematical truths with the evidence of the senses. Because of the problems of chronology (as well as uncertainty about Zeno's own works), we cannot confidently insist on any relation between Anaxagoras and Zeno. Nothing in the Anaxagorean texts forces us to understand him as reacting to problems raised by Zeno; rather, those texts can be seen as part of Anaxagoras's response to Parmenides' rejection of what-is-not (which was also an influence on Zeno's own work).

Tradition tells us that Archelaus was the pupil of Anaxagoras, and in this case the tradition is most likely correct; in additional, Archelaus is said to have been the teacher of Socrates.[18] It is possible that he is the person Socrates heard reading from Anaxagoras's book (assuming that we can trust the account given in the *Phaedo*; see A47). Did Socrates and Anaxagoras ever meet? The prospect is tantalizing, and it is hard to imagine that in a city as small as Athens at the time they did not, but we shall never know. Plato never mentions or implies such a meeting in his

16 If Zeller's suggestion of τομῇ ('by cutting') for the τὸ μή of the manuscripts in B3 were correct, the suggestion of a connection with Zeno could be strengthened. For further discussion, see the Note on B3, and Essay 3.

17 Among those who see Anaxagoras responding to Zeno are Gigon, Raven (his view is repeated in Kirk and Raven; there is more caution in KRS, as there is in Schofield's *Essay*), Strang, Guthrie, and McKirahan. Furley ('Response'), adopting an early date for the publication of Anaxagoras's book, argues that Zeno responds to Anaxagoras, as does Luria. Barnes remains agnostic, as does Sider in *Fragments* (although he is tempted by the Furley view on pp. 7–8). As Schofield says, 'Apparent echoes of Zeno in Anaxagoras may be echoes of Anaxagoras in Zeno – or (although this is unlikely) sheer coincidence' (81).

18 Diogenes Laertius 2.16 (DK 60A1). Theophrastus says the same thing in DK 60A5. Diogenes Laertius says that Archelaus first brought 'physical philosophy' from Ionia to Athens; as we have seen, it was certainly Anaxagoras who did this. Given the relation between the two and the similarities in their work, it is, perhaps, no surprise that the tradition should blend or confuse certain aspects of their lives.

dialogues. Some have taken his silence on this, and his making Socrates claim that he learned of Anaxagoras's views from someone else and from reading Anaxagoras's book, as evidence that Anaxagoras had left Athens well before Socrates became active as a philosopher, and so the two never met.[19] This argument is not compelling. Plato never represents Socrates as talking to Archelaus; indeed, in the dialogues Socrates never discusses natural philosophy, as such, with anyone (except in the *Timaeus*, and his interlocutor there is fictional). In the *Phaedo*, arguing for the immortality of the soul, Socrates describes views about causation and explanation that he had explored as a young man, and certain of those views can be ascribed to Anaxagoras (e.g., that in nutrition flesh is added to flesh; A46). But the suggestion in the passage is that Socrates adopted inquiry into natural things on his own, as a youthful enthusiasm, and the contrast between his early study of physics and the face-to-face arguments concerning virtue, moral knowledge, and the care of the soul that engage the mature Socrates is striking (and perhaps part of the point Plato wishes to make about the proper topics and method for philosophical inquiry). Moreover, suppose that Plato had represented Socrates as learning Anaxagoras's views on *Nous* from Anaxagoras himself; it would be most surprising if Socrates had not taken the opportunity to question Anaxagoras about those views, arguing with him about their (to Socrates) unsatisfactory character. Not only would a long discussion of Anaxagoras's characterization of *Nous* distract from the point Plato is trying to make in this part of the *Phaedo*, it might also prove awkward to Socrates who, after all, at this point in

19 See, for instance, Woodbury, who argues strongly for an early date into and out of the city for Anaxagoras partially on the strength of Plato's silence. Mansfeld takes the evidence of the *Phaedo* (and especially Socrates' comments about *Nous*) to mean 'that Anaxagoras's book, when Socrates got hold of it c. 440 BC was something of a novelty' (review of Schofield 366; cf. 'Chronology' 300–301). In Plato's *Apology*, Socrates says to his accuser, 'Do you imagine that you are prosecuting Anaxagoras, my dear Meletus, and are you so disdainful of the jury, supposing they are so illiterate that they do not know that the books of Anaxagoras of Clazomenae are full of these doctrines? And do you suppose that the young men in fact learn from me these things, which they can buy from time to time for a drachma (at most) in the orchestra, and laugh at Socrates, if he pretends that they are his own . . . ?' (A35). This might be evidence that Anaxagoras had left Athens so long before 399 that the members of the jury would not have first-hand knowledge of Anaxagoras or his doctrines (see esp. Woodbury 295–96). Yet, some of the jurors would be young enough (or ignorant enough of philosophy) not to have such knowledge, and it is crucial to Socrates' retort to Meletus that Anaxagoras's work be readily available to young Athenians. It must also be borne in mind that the Socrates of Plato's dialogues is a character whose relation to the historical Socrates is problematic; the Platonic dialogues must be used as historical sources with caution.

the dialogue, does not really have anything very substantial to say about the nature of mind or soul as a teleological cause himself.[20] So, we do not know whether Anaxagoras and Socrates met, fascinating though such an encounter would have been.[21]

Both Anaxagoras and Socrates were tried for impiety. Anaxagoras's claims that the heavenly bodies were stones no doubt played some role in the charges; his naturalism was notorious. In A16 Plutarch reports that because of his association with Anaxagoras Pericles rejected religious superstition and embraced natural philosophy. Plutarch recounts that the head of a one-horned ram was brought in from the country. Lampon the soothsayer claimed it was a divine sign, while Anaxagoras had the skull cut in half and gave a rational explanation of the phenomenon. Plutarch's version of the story says that Anaxagoras was much admired for this, although Plutarch suggests that the admiration was fleeting and tied to the changing politics of the day. Although there are several versions of Anaxagoras's trial and its outcome (see Diogenes Laertius in A1, for instance), and some scholars even deny that Anaxagoras was tried by the Athenians, there seems little reason to doubt the tradition on this question. Whether the case was brought for purely religious reasons or whether it was an attempt to undermine his friend and patron Pericles is unclear. Probably, as in the later cases of Socrates and Aristotle, there were both politics and outraged piety involved. Some testimonia say that he was fined and banished, others that he was condemned to death (though spared through the intervention of Pericles). In any case, the biographies say that he left Athens and lived out his life in Lampsacus, where he was respected and honoured (a statue was erected in his honour, and at his request, children were granted a holiday on the anniversary of his death).

Despite Socrates' reference to Anaxagoras's 'books' in the *Apology* and the *Phaedo* (A35 and A47), it is probable that Anaxagoras's teachings were contained in a single book (in A37 Diogenes Laertius lists Anaxagoras among those who published only one book). Schofield suggests that the

20 Socrates is convinced that all good explanations are teleological, but he does not explain why this must be so. He also claims that soul and life are always connected, but the argument is not strong. Moreover, insofar as it lacks a teleological element, Socrates' hypothesis about Forms as causes or explanations in the *Phaedo* is introduced as a 'second best' theory.

21 See also Mansfeld's comment: 'The Platonic Socrates never meets Pericles or such fascinating members of Pericles' circle as Phidias, and he is only reported to have had, not a discussion with, but lessons from, Aspasia, at a "dramatic" time when both had long been dead' ('Chronology' 299). The reference is to the *Menexenus*, whose dramatic date seems to be some time after the Corinthian war of 395–387.

book contained the results of Anaxagoras's thought over many years, and that certain of his views could have become known in Athens (and other parts of the Greek-speaking world) before the official publication of the book.[22] Diogenes Laertius says that the book 'is expressed in a pleasant and high-minded style,' although it is not clear how much (if any) of the book Diogenes actually knew first-hand. The fragments that we have indicate that Anaxagoras laid out his claims with some argument (although not as much as we find, for instance, in Parmenides), and that he saw the parts of his theory as systematically connected. Our fragments deal primarily with the metaphysical basis of the theory, and describe the original state of the cosmos, the processes of separation and mixture originated by *Nous*, and other cosmological processes. Most of these fragments come from Simplicius, with a few that are concerned with perception and epistemological questions coming from Sextus Empiricus. The doxographical tradition has preserved reports of other features of Anaxagoras' theories, though not, as far as we can tell, actual passages from the book in which these views were expressed.[23] Like other Presocratic thinkers, Anaxagoras wrote on a wide range of topics, including metaphysics and epistemology, cosmogony and cosmology, the stars, sun, moon, and meteorological and geological phenomena in the sublunary world (clouds, rainbows, rain, snow, earthquakes, rivers), perception, embryology, and so on. Traces of these theories (mostly in the form of statements about or mentions of Anaxagoras's views) can be found in the testimonia. There is little evidence of systematic political or ethical theories, although hints surface here and there that Anaxagoras had views about the best way for human beings to live.

1.2 Parmenides and the Response to Eleaticism

The arguments of Parmenides were crucial for the generation of Presocratics who came after him, and that includes Anaxagoras. It is worthwhile, then, to consider those arguments and their consequences. Parmenides' view implies that any theoretically acceptable cosmology must be rational, that is, its physics must be grounded in a true metaphysics in order for it to qualify as even a potential candidate for an account of what there is. Although none of the later Presocratics adopted his views in their entirety, all recognized the significance of Parmenides' claims about the nature of what-is and the importance of the attendant denial of the reality of coming-to-be and passing-away.

22 Schofield 29–32; see also Casson and Harris on Greek literacy and books.

23 A possible fragment on fire is preserved in Thucydides' *History* (2.77.4) and in Lucretius (A44). The evidence and a discussion can be found in Calder.

One way to approach Parmenides' thought is to ask who might be the target of his arguments. The goddess who presents the claims of the poem about what-is says that two ways for thought and inquiry are possible:

Come now, and I will tell you, and you, hearing, preserve the story,
the only routes of inquiry there are for thinking;
the one that it is and that it cannot not be
is the path of Persuasion (for it attends on truth)
the other, that it is not and that it is right that it not be,
this I point out to you is a path wholly inscrutable
for you could not know what is not (for it is not to be accomplished)
nor could you point it out ... (28B2)
... for the same thing is for thinking and for being. (28B3)

The language of routes suggests that Parmenides is as much interested in how one undertakes inquiry as in its outcome; successful method will result in successful outcome. He first shows that what-is-not is impossible by claiming that it cannot be thought; he then argues that an inquiry that puts the inquirer on the path of what-is-not will fail.[24] It has been supposed that the goddess's argument applies to any sort of inquiry, but I doubt that this is correct.[25] Rather, the issue is inquiry into the nature of things, how things really are. The first words of the goddess (after her greeting) are, 'It is right that you learn all things, both the unshaking heart of well-persuasive truth, and the beliefs of mortals in which there is no true trust' (28B1.28–30). The hearer will understand how to protect himself from error and to judge correctly. In 28B10, the goddess describes what her pupil will learn:

And you will know the nature of the aether and all the signs
in the aether and the destructive works of the bright sun's
pure torch, and from whence they came to be,
and you will learn the wandering works of the round-eyed moon
and its nature, and you will know also the surrounding heaven

24 The whole of Parmenides' poem is narrated by a nameless youth (the *kouros*) and the arguments are presented by a nameless goddess; nevertheless I am convinced that the conclusions are Parmenides' own.

25 For the wide scope interpretation of inquiry, see Furth in 'Elements' and Barnes's discussion of Parmenides in chapter 9 of *Presocratic*.

whence it grew and how Necessity led and bound it
to hold the limits of the stars.[26]

This list gives the contents of a typical Presocratic cosmology. The goddess offers her arguments as a rival to other attempts to explain the world that human beings perceive. Her target, then, is Parmenides' predecessors who had attempted to explain the workings of the sensible world by giving an account of the nature of things. Parmenides works within that same tradition, but with a crucial difference. When the goddess says that we will learn 'all things' from her, she does not mean that we will acquire a very long list of all the facts about everything. Rather, her teaching provides a formal analysis that will allow us to determine whether or not an account of what there is qualifies as acceptable. Parmenides is giving us criteria for choosing between rival accounts of the nature of things. The argument is meta-theoretical. He tells us how to judge or decide (*krinein*) whether a theory is adequately grounded. Such a theory must begin with entities that are metaphysically acceptable. This keeps the understanding of the inquirer on the path of what-is rather than allowing it to wander into the realm of what-is-not, for that is vague and unthinkable.[27] One cannot give an adequate account of the basic reality of things by beginning with what-is-not: there is nothing to grasp there, nothing about which to think. As 28B2 says, such a route can never be completed (it is inscrutable, never to be accomplished), because one can never succeed in grasping an account of what there is given in negative terms. The same thing is for thinking and for being, so what-is-not cannot be grasped. Genuine thought or understanding aims at what genuinely is, which is the foundation for a rational and coherent account of the nature of things. Mortals, who suppose that coming-to-be and passing-away are real, fail to think correctly, aiming their *noos* at the wrong target, and losing their way in inquiry.

The claims of Parmenides B2 set out the limits of coherent and successful thought that stays on the route of what-is. Parmenides then provides the tests that allow an inquirer to determine whether or not the basic entities of a theory qualify as what-is. These tests are given in 28B8, which

26 It has been suggested that Parmenides B10 belongs just after B1 in the order of Parmenides' fragments. This may indeed be correct; B10 would also fit well at the end of B8. See Bicknell for the arguments.

27 A crucial aspect of Parmenides' thought is the requirement that a thinker must control his understanding, or *noos*, not allowing it to stray away to the path of what-is-not. (Parmenides' *noos* and Anaxagoras' *nous* are the same word, spelled differently in the different dialects that each used.)

begins with a statement of the signs that indicate that one is on the correct route:

> . . . a single account still
> remains of the route that it is; and on this route there are
> very many signs, that what-is is ungenerable and imperishable,
> a whole of a single kind, and unshaking and complete;
> nor was it nor will it be, since it is now all together
> one, cohesive. (28B8.1–6)

These signs point to the nature of what-is and serve as principles to be followed in reaching an adequate account of it; the later arguments of 28B8 provide the proofs of the signs, showing that only they are consistent with the claim implied by 28B2 that what-is 'is and cannot not be.' The deciding test, applied repeatedly through the arguments of 28B8, is 'is or is not?' This is stated explicitly at 28B8.15–18:

> and the decision about these is in this:
> is or is not; and it has been decided just as is necessary,
> to leave the one unthinkable and unnamed (for it is not a true
> route), and the other to be and to be genuine.

A thinker who controls his thought (*noos*) will arrive at a correct analysis of what-is, and can test the basic entities in his account of what there is, showing that they satisfy the Parmenidean requirements. If they do meet the criteria, he can develop from them a physics of the sensible world that is grounded in an acceptable metaphysics. Parmenides challenges later thinkers to provide such a rational cosmology. Inquiring in the wrong way, that is, attempting to begin with entities that fail to satisfy the criteria, sends one off onto a wandering, backward-turning path; on this path one can never reach the proper end of inquiry, the perfected, completed entity that genuinely is (neither coming-to-be nor passing-away and a whole of a single kind) that is the only object of genuine thought.[28]

Parmenides is often (but not universally) taken to be a numerical monist, who argues that there exists only one thing (available to thought but not perception), that perceptible phenomena are unreal, and that therefore physics is theoretically impossible. I think that this view of Parmenides is wrong. Once we give it up, developments in later Presocratic thought,

28 See the descriptions of the tribulations of mortals with wandering thought in 28B6 and B7.

including the theories of Anaxagoras, become easier to understand.[29] In book 1 of the *Metaphysics*, Aristotle contrasts Parmenides and Melissus. Recognizing certain affinities among the Eleatics, 'those who spoke of the universe as having a single nature,' he also notes differences: 'Parmenides seems to fasten on what is one in definition (*logos*), Melissus on that which is one in matter' (*Met*. 1.5; 986b10–11, 19–20).[30] Although Aristotle seems to have thought that numerical monism is a consequence of Parmenides' claim, he recognizes that Parmenides' arguments are primarily about determining the nature or essence of a thing, and that Melissus is more clearly concerned with the numerical version of monism.[31] This interpretation is evident in *Physics* 1 (at 186a22–25), where Aristotle says of Parmenides that 'his false assumption is that things are said to be in only one way when in fact they are said to be in many.' Parmenides thinks that the only way to be is to be an essence or the nature of a thing; thus only what is metaphysically basic is genuinely real. Only what is real or what is related to what is real in the proper way can be an object of successful inquiry. What-is is the natural home of real thought or understanding; one cannot think or grasp what-is-not in the strong sense of 'is' (being an essence or a nature) that Parmenides investigates. What is real or genuine, what is to be known and understood, cannot change, for that would entail a change from what-is to what-is-not. Each metaphysically basic entity will be a unified whole, a Parmenidean one. In the signs of the opening lines of 28B8 and in the arguments that support and explain those signs, Parmenides tells us *how* such an entity is, but he does not tell us what such entities are. Later Presocratic thinkers, including Anaxagoras, undertake to do so.

Anaxagoras posits two kinds of basic entity: the ingredients of the original mixture and Mind (*Nous*). The ingredients are the building blocks, the stuffs of the *kosmos*,[32] while Mind plays a fundamental role in world-making. Both are unchanging in their natures (although the ingredients can separate off, mix, and dissociate from mixtures, and *Nous* is present in some things), and both play epistemological roles (on the

29 I defend this account in *Legacy*, chapter 2.

30 In *Met*. 5.6 Aristotle explores the various senses of 'one,' and says that things are one in *logos* when statements of their essences are indivisible (1016a32–35).

31 I think that Aristotle supposes that numerical monism is a consequence of Parmenides' claim (and he may be right about this), but he sees that numerical monism comes less directly from Parmenides' argument than from Melissus' assertion that all things are one in matter. See also *Phys*. 1.2 185b8, 19–25. On the conflation of the views of Parmenides and Melissus, see Barnes ('Eleatic One').

32 These are not matter in the Aristotelian sense: 'matter' ('*hylē*') is an Aristotelian coinage, and it comes into later philosophical discussions weighed down with Aristotelian presuppositions that are inappropriate for discussions of pre-Platonic thought.

one hand, as known, and on the other, as knower).[33] The characteristics of the ingredients and of *Nous* are grounded in Eleatic principles. In B17 Anaxagoras rejects the reality of coming-to-be and passing-away, replacing them with the processes of mixture and dissociation, and in B3 he denies that there can be a smallest, but only a smaller, because 'what is cannot not be.' The principles of unlimited smallness and of universal mixture are fundamental to Anaxagoras's theory, and they have puzzled many commentators. These crucial aspects of Anaxagoras's theory, which are explored more fully in the next four essays, can be traced to his acceptance of Parmenides' arguments.

1.3 Anaxagoras and Later Greek Thought

Although little is known about Anaxagoras's philosophical activities, even while he was in Athens, he was an important figure for later philosophers in the city. Some Athenians linked Anaxagoras with the Sophists, but it is difficult to evaluate such claims, given the paucity of evidence for his political and ethical views. The testimonia indicate that Anaxagoras was an influence on Pericles during the latter's political career. Democritus, who was younger than Anaxagoras, apparently came to Athens while Anaxagoras was living there, and reports from Diogenes Laertius hint at an uneasy relation between the two (see A1 and A5). Other doxographical reports indicate that they shared some cosmological views (A39, A66, A77, A78, A79, A81, A87, A88, A107, A117), and Diogenes Laertius reports Favorinus's claim that Democritus accused Anaxagoras of plagiarizing certain ancient ideas. Although Anaxagoras and Democritus both wrestled with the Eleatic problem of a metaphysically respectable cosmology, they came to quite different conclusions. It is possible that Zeno's rejection of infinite division was aimed at Anaxagoras and influenced the Atomists. Like Anaxagoras, the Atomists posited an unlimited number of starting ingredients, but unlike Anaxagoras' original stuffs and opposites, these ingredients, the atoms, are solid and uncuttable, and all alike in essence. All atomic stuff is the same, and atoms differ only in shape, arrangement, and, possibly, weight. Unlike Anaxagoras's original unlimited mass of ingredients, which is a plenum, the atomists' cosmos includes void (or what-is-not).[34]

33 Similar patterns of post-Eleatic explanation can be found in the views of Empedocles and in pre-Platonic atomism, as well as in Plato's own Theory of Forms.

34 The atomist theorist Leucippus was probably closer to Anaxagoras chronologically, but we know little of his own views. Here I speak only of 'atomism.' For a clear discussion of atomism, see C.C.W. Taylor's book in this series and his 'Anaxagoras and the Atomists.'

Anaxagoras's doctrine of complete mixture (the everything-in-everything principle) and his claim that Mind (*Nous*) is the controlling cosmic force fascinated and perplexed later thinkers. The Derveni Papyrus, an intriguing and controversial document, perhaps the oldest Greek papyrus so far discovered, includes a naturalized explanation of some aspects of Orphic thought. The Derveni author mentions Heraclitus by name; there is no extant explicit reference to Anaxagoras, but he seems to have adopted, albeit with modifications, both Anaxagoras's view that Mind (*Nous*) is the controlling cosmic force, and certain aspects of his view of ingredients.[35] The Derveni author is more willing than Anaxagoras to identify Mind with god or the divine (and indeed with a personal god); influenced by Anaximenes, he connects Mind and Air in a way that distinguishes his view from that of Anaxagoras, but which might also have connections with Diogenes of Apollonia.

Plato, Aristotle, and Theophrastus all responded critically to Anaxagoras's work. Plato mentions Anaxagoras by name in a number of dialogues; he also occasionally refers obliquely to Anaxagoras's life and theories (A13, A15, A55, A75). In the *Apology* Socrates suggests that Meletus, his accuser, wilfully conflates Anaxagoras's naturalistic philosophy with Socrates' own, less theologically unacceptable views (A35); in the *Phaedo* Socrates explicitly disparages Anaxagoras's use of *Nous* (A46, A47, A53) and implicitly

Although the title of Taylor's article might suggest a doctrinal connection between Anaxagoras and atomism, he discusses the two subjects separately.

35 The papyrus was found at an ancient burial site in 1962; the text was published by Kouremenos, Parássoglou, and Tsantsanoglou in 2006. Much about the papyrus is controversial; detailed discussions can be found in Kouremenos et al., in Laks and Most, in Betegh, and in Janko. According to Betegh, 'Most papyrologists agree on the basis of its paleographical features that the manuscript must be dated to the second half of the fourth century BC' (61), and this is now supported by Tsantsanoglou in Kouremenos et al., but other dates, between the 420s and 275 BC have also been suggested. Janko, who provided a provisional text (in 'Interim'), opts for an early date; he describes the papyrus as 'containing a treatise by a follower of Anaxagoras, probably written in the 420's B.C.E.' (review of Betegh, 1). Tsantsanoglou agrees about the date of the treatise: 'the work was about a century old when the roll was burnt' (the discussion of the dates are on pp. 8–10). A number of scholars have seen the influence from Anaxagoras (see Betegh, Laks and Most, and Kouremenos in parts 5–7 of the Introduction of Kouremenos et al. for discussions). Betegh evaluates the evidence for Anaxagorean influence in chap. 7 of his study of the papyrus, and argues that although Anaxagorean traces are obvious in the Derveni author's account of mind and certain of his cosmological views, we cannot be certain 'how immediate this influence was,' and that it is best to adopt a cautious attitude at present. Kouremenos, also cautious, explores the similarities and differences between Anaxagoras's *Nous* and the Derveni author's air/Mind.

criticizes the everything-in-everything principle. Despite his overt criticism, Plato makes use of Anaxagorean notions and language, and he agrees with many of the assumptions in Anaxagoras's work. Plato accepts the same Parmenidean requirements on what-is as metaphysically and epistemologically basic; likewise, he agrees that the manifestation of a property or characteristic by a sensible object is to be explained by the presence *in* that object of the character. If a Platonic sensible particular is said to be large, that claim is not literally true, for such a perceptible thing cannot *be* large, but merely *has* largeness in it through having a share of the Large itself, and so through having Largeness in it. Like Anaxagorean ingredients and opposites, Platonic Forms have natures or essences that must be grasped by reason or understanding. Plato seems to have found Anaxagoras's vocabulary and notions useful in explaining his own views; yet there are profound differences between the two philosophical theories.[36] Many of the properties or characters that Plato explicitly discusses in the dialogues are moral, normative, or logical (Justice, Beauty, Equality, or Sameness, for instance), while Anaxagoras concentrates on explanations of the natural world, and there is no mention of normative or comparative items such as these in his original mixture. Plato forcefully rejects Anaxagoras's everything-in-everything principle. Platonic Forms are not only distinct but separate: they are what they are in themselves and by themselves. In this they are unlike the Anaxagorean basic ingredients; Platonic Forms are like *Nous*, which alone of Anaxagorean entities can be separate, and which is 'by itself' (B8, B12). Plato doubts that an Anaxagorean theory of universal mixture can explain differentiations of properties (*Phd*. 72c, quoted in A54). Nevertheless, Plato agrees that sensible particulars are mixtures of very many ingredients (see *Rep*. 5, 476aff.). The complete separation of Platonic Forms from particulars leads to its own problems, which are foreshadowed by the difficulty that commentators have in understanding how *Nous* can be in things but not part of the original mixture, and how *Nous* can control the cosmos while having no characteristics in common with it.

As we shall see in Essay 4, *Nous* in Anaxagoras's theory is a source of motion and change, and the principle of intelligibility in Anaxagoras' universe. It is not an external teleological principle, in the sense of determining a plan or purpose for the cosmos. We have already noted that while Plato's Socrates criticizes Anaxagoras's *Nous* for the lack of normative teleology, this complaint could also be lodged against Socrates' own statement of the Theory of Forms in the *Phaedo*. Socrates acknowledges this in the

36 Discussions of Anaxagorean models of causation or explanation in Plato can be found in Dancy, W.-R. Mann, Ledbetter, and Teloh.

Phaedo, offering the theory given there as a sort of promissory note, a second-best theory of causation and explanation that could be improved by the addition of a full teleological account of the appropriate sort. Plato gives a broader teleological account in the *Republic* with the introduction of the Form of the Good; the comprehensive teleological story is not told until the *Timaeus*; even there, the Demiurge and its actions perhaps retain traces of Anaxagorean *Nous*.

Aristotle's treatment of his predecessors is more systematic and comprehensive than Plato's, for he often reviews earlier theories as a prologue to his own accounts of philosophical problems. His philosophical treatments of Anaxagoras concentrate on the original mixture and Anaxagoras's account of *Nous*.[37] In both the *Physics* and the *On Generation and Corruption*, Aristotle groups Anaxagoras with those who think that there are a plurality of principles of what-is and of change (*Phys.* 187a20ff.). Aristotle notes (A55) the importance of the denial of the reality of coming-to-be and passing-away for Anaxagoras, and in both the *Physics* and the *On Generation and Corruption* he asserts that Anaxagoras does away with coming-to-be and reduces it to alteration (A54). The claim that coming-to-be is to be identified with alteration is not Anaxagoras's own, but Aristotle's interpretation of Anaxagoras's claims about the original mixture and the impossibility of genuine coming-to-be.[38] For Aristotle, this identification of alteration and coming-to-be is a serious problem, but it is clear that Anaxagoras would have a different view. In *De Caelo*, Aristotle discusses Anaxagoras's basic ingredients, but again in the context of his own account of the elements earth, water, air, and fire. Despite his own reliance on mixture in his theories, Aristotle is more interested in the number and nature of the ingredients with which Anaxagoras begins his account, and less interested in the mechanics of Anaxagoras's system, which, from Aristotle's point of view, fail to provide a coherent analysis of the four causes of any change and of the basic principles through which we understand the cosmos.[39]

37 Aristotle discusses Anaxagoras primarily in the *Physics*, *De Caelo*, *Metaphysics*, *De Anima*, and *On Generation and Corruption*. Anaxagoras's scientific views are also mentioned in the *Meteorology*, the *Generation of Animals* and *Parts of Animals*, and both versions of the *Ethics* (among other Aristotelian works).

38 A discussion of Aristotle on Anaxagoras in *GC* (ibid) can be found in Brunschwig. The philosophical worry about marking a distinction between coming-to-be and altering probably belongs to the fourth century BC Aristotle's word for 'alteration' (*alloiōsis*) rarely occurs in Presocratic texts and never in Anaxagoras. (A TLG search of DK turns up occurrences in fragments of Heraclitus, Empedocles, and Diogenes of Apollonia; other occurrences are in testimonia.)

39 Other difficulties raised by Aristotle's accounts of Anaxagoras are discussed in the next section.

Like Plato, Aristotle is dissatisfied with Anaxagoras's account of *Nous*. Unlike Plato, Aristotle does not direct his criticism against the lack of teleology in Anaxagoras's theory. Rather, he complains that Anaxagoras has not sufficiently distinguished between soul and *Nous*, and that Anaxagoras attributes to *Nous* motive powers that more properly belong to soul. On Aristotle's view, Anaxagoras should be more discriminating in his accounts of the powers of *Nous* and should not conflate the separate and fundamentally different powers of thought and sublunary motion (A55).[40] This complaint also exhibits Aristotle's own view of things, for he argues that the powers of nutrition, growth, locomotion, and perception belong to non-rational aspects of soul. Further, in *De Anima* Aristotle complains that Anaxagoras has not fully explained how *Nous* knows and understands; he claims that Anaxagoras gave no adequate explanation of how *Nous* can know given its utter difference from everything else and its impassibility, that is, its invulnerability to being affected by anything else (A100). Nevertheless, Aristotle praises (if slightly backhandedly) Anaxagoras's view that *Nous* controls the universe: 'When someone said that *Nous* is present – in nature just as it is in animals – as the cause of the cosmos and of all its order, he appeared as a sober man among the random chatterers who preceded him. We know that Anaxagoras clearly held these views, but Hermotimus of Clazomenae gets the credit of holding them earlier' (A58).

1.4 Anaxagoras in Aristotle

Any study of the Presocratics must face the problem of how to treat the historical tradition, the doxography. This is the way that a philosopher's views are reported and handed on from one philosopher or historian to another.[41] Just as the ancient chroniclers were not primarily interested in bare historical facts, so ancient philosophers and doxographers were not primarily concerned to preserve intact the words or views of a particular philosopher. Aristotle, for instance, was interested in his predecessors' ideas not primarily as a historian, but as a working philosopher, explaining what was (from the point of view of his own theories) correct and what incorrect in earlier positions. In addition, Aristotle often 'translated' an earlier philosopher, using his own technical terms to describe or summarize a predecessor's ideas. While Aristotle had one of the great libraries of

40 Aristotle's own cosmic *Nous*, the unmoved mover, is also the source of motion, but it moves things by being an object of desire (see *Metaphysics* 12).

41 Good accounts of the doxographical tradition and its problems may be found in Mansfeld and Runia, Mansfeld ('Sources') and Runia.

the ancient world, in his own writings he paraphrases, quotes from memory, and summarizes his predecessors' views; sometimes the reports on a philosopher's position are inconsistent from one of Aristotle's works to another. In many cases, later reports on the Presocratics can be traced back to Aristotle or to his colleague Theophrastus, who was heavily influenced by him. Because so much of the original work has been lost, we frequently have no independent check on what Aristotle says. So, Aristotle's accounts of a philosopher, even his most casual remarks, have turned out to be remarkably influential.[42]

Aristotle's method of treating earlier thinkers has resulted in some confusions about Anaxagoras's doctrines. First, there is the question of the so-called homogeneous stuffs in Anaxagoras. In Greek, the word is *homoiomerē*. At *De Generatione et Corruptione* 1.1 314a18–20, Aristotle defines the *homoiomerous* (or, as I translate, *homogeneous*) parts as those that have the same name as the whole, and they play an important role in his scientific theory.[43] Although the adjective '*homoiomerous*' applies to a number of things (including minerals), Aristotle usually applies it to biological stuffs that are intermediate between his elements (earth, water, air, and fire) and organs and other body parts. Thus, flesh, blood, and bone are on his usual list of homogeneous stuffs, but earth, water, air, and fire are not. Aristotle claims that Anaxagoras 'makes homogeneous stuffs elements' (see A43, A45, A46), and this has led some modern commentators to the view that Anaxagoras adopted the so-called 'principle of homoiomereity' (adapted from the Greek word). According to this principle, 'a natural substance [in Anaxagoras] such as a piece of gold consists solely of parts which are like the whole and are like one another – every one of them and nothing else.'[44] Second (and related to the first), in some of Aristotle's accounts of Anaxagoras's principles, he claims that fire and air (and the other

42 On Aristotle and Theophrastus, see Cherniss, McDiarmid, and Baltussen.

43 For a thorough discussion of the Aristotelian notion of a homogeneous part and its possible role in Anaxagoras, see W. Mann, esp. 231–33. See also the helpful discussions in Furley (*Cosmologists* 68–69) and 'Response' (his main points on this issue are summarized in his 'Naming of Parts,' on 119–20). Lewis discusses the differences between Aristotle's 'official' definition and the term as it is often used in discussions of Anaxagoras (14–15 n. 25).

44 This statement of the principle comes from Cornford 'Matter' 275. Cornford notes that the principle conflicts with the 'everything in everything' principle. They cannot both be true: something cannot be all and only gold and at the same time contain some of everything else. The principle of homoiomereity could apply if the blend of all in all were such that all the ingredients were evenly and smoothly distributed throughout the mixture. The evidence of B12 ('each one is and was most manifestly those things of which there are the most in it') shows that Anaxagoras does not think that this is

things that Aristotle calls 'elements') are not basic for Anaxagoras, but are dependent compounds made up of certain stuffs (those that Aristotle calls 'homogeneous parts'). Although the later tradition has, particularly in the case of the principle of homoiomereity, enthusiastically adopted Aristotle's nomenclature and interpretation, there is difficulty squaring these claims with the extant Anaxagorean texts. Like other modern scholars, I maintain that the term 'homogeneous stuffs' originated with Aristotle and that it is unlikely that Anaxagoras used it.[45] I think that Aristotle does not mean literally to attribute a doctrine of homogeneous stuffs to Anaxagoras, and that Aristotle is wrong to suggest that fire and air are not basic in Anaxagoras's system. Because these claims are fundamental to understanding Anaxagoras, and because they will appear in several discussions in later essays, it is worthwhile to spend some time discussing them.

In several places, Aristotle says that, for Anaxagoras, the homogeneous things are elemental.[46] Several later ancient commentators interpreted Aristotle as saying that Anaxagoras held the principle of homoiomereity (see Diogenes Laertius A1, Plutarch A15, Simplicius A41 and 45, Lucretius A44, Aëtius A46 and 51, Galen A104); this interpretation has been followed by some modern scholars. Nevertheless, other modern commentators have noted that the principle is inconsistent with Anaxagoras's other doctrines, notably, the everything-in-everything principle. Some rather ingenious claims have been made on Anaxagoras's behalf in order to maintain the principle and avoid contradiction at the very heart of his theory.[47] But if we look carefully at what Aristotle says, it becomes clear that Aristotle does not attribute a principle of homoiomereity to Anaxagoras. At *De Generatione et Corruptione* 314a18 (A46) Aristotle says, 'Anaxagoras ... [says that the elements are unlimited in number], for he makes the homogeneous stuffs elements, for instance, bone and flesh and marrow and the others of which the part is called by the same name as the whole.' This is repeated at *Physics* 1.4 187a25–26 where, contrasting Anaxagoras and Empedocles, Aristotle claims: 'Anaxagoras makes [the principles] infinite, both the homogeneous stuffs and the opposites, while for Empedocles the so-called elements alone are principles.' It is in Aristotle that we first find the word 'element' (*stoicheon*) used in its technical philosoph-

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the case. As I argue in Essay 3, the mixture of all in all contains different densities of ingredients in different areas of the mix and at different times.

45 Graham ('Postulates') gives a full account of why the principle of homoiomereity is not to be found in Anaxagoras. See also Furley's discussions mentioned in note 43, above.

46 See *GC* 314a18; *Cael.* 302a28; *Ph.* 1.4 187a25–26.

47 See, for instance, Cornford and others who think that the basic entities in Anaxagoras should be limited to the opposites, discussed in Essay 2.

ical sense as something that is basic.[48] In both these cases, Aristotle is using his own vocabulary to discuss his predecessors' explanations of the principles of nature and the processes of coming-to-be and passing-away. Because flesh, blood, bone, and the minerals are, for Aristotle, compounds of his elements earth, water, air, and fire, he classifies these things that he calls homogeneous as non-elemental (in his sense). In contrast, Anaxagoras counted such things as flesh, blood, bone, and gold as metaphysically basic, and Aristotle records this by saying that Anaxagoras has an indefinite number of basic principles because Anaxagoras makes (Aristotelian) homogeneous things, as well as the opposites, into (Aristotelian) elements, while Empedocles, who made earth, water, air, and fire basic, is reported to have restricted the principles of nature to the (Aristotelian) elements. Thus, there is no reason to think that Aristotle is attributing a principle of homoiomereity to Anaxagoras, and given the well-attested principle of everything-in-everything and Anaxagoras's claim in B12 that each thing 'is and was most manifestly those things of which there are the most in it,' there are good reasons to deny that Anaxagoras adopted such a principle.

Similarly, Aristotle's testimony about the status of fire and air in Anaxagoras is misleading. Here are the relevant passages:

(1) Anaxagoras says just the opposite of Empedocles about the elements. For Empedocles claims that fire and earth, and things of the same rank as they, are elements of bodies and that all things are compounded of them; but Anaxagoras says the opposite. For he claims that the homogeneous stuffs are elements, I mean, for instance, flesh and bone and each of the things of that sort, and that air and fire are mixtures of them and of all the other seeds; for each of them is a collection of all the invisible homogeneous stuffs. This is why everything comes to be from these two. (For he calls fire and aether the same thing.) (*De Caelo* 302a28ff.; A43)

(2) The Anaxagoreans say that the homogeneous stuffs are simple and are elements, but that earth and fire and water and air are compounds – for each of them is a *panspermia* of those things. (*De Generatione et Corruptione* 314a28–b1; not in DK)

There are two mysteries in Aristotle's account. First, in both passages Aristotle says that fire and air and (by extension in text 1 and explicitly in text 2) earth and water are not basic things for Anaxagoras, but compounds,

48 While Aristotle was the first to use *stoicheon* in this philosophically technical sense, Simplicius points out (following Eudemus) that the word also appears in Plato with a meaning rather like 'element.' Simplicius *in Phys*. 7.13; see *Tht*. 201e1 and *Crt*. 424e4.

made out of the genuinely basic things, the homogeneous stuffs. The second oddity is the claim in text 2 that earth, water, air, and fire are each a *panspermia* (whatever that means) of the simpler things. As we shall see in Essay 2, there is good reason to think that Aristotle is mistaken in thinking that earth, water, air, and fire are not basic for Anaxagoras. The fragments provide evidence for this. Anaxagoras indeed thinks that there is mixture of the things that are; not only is there a complete mixture before *Nous* sets the rotation going (fragment B1), but also even now 'all things are together' (fragment B12). In that sense, the Aristotelian elements (earth, water, air, and fire) are themselves mixed things, but this does not make them any different in Anaxagoras's system from what Aristotle calls the homogeneous stuffs; for Anaxagoras, these too are always mixed things in the actual world (see B12). It is crucial to Anaxagoras's theory that the basic things never actually occur in pure states. Nevertheless, this does not entail that they do not have natures that determine their character, and which can be known by *Nous*.[49] So, on those grounds, there is no reason for Aristotle to claim that the stuffs that *he* calls homogeneous are more basic than the stuffs that *he* calls elements. Aristotle seems unwilling to think that Anaxagoras could have put the elements (earth, water, air, and fire) and the homogeneous stuffs (again using Aristotle's terms) at the same metaphysical level.[50] The difficulty for Aristotle is not why Anaxagoras thinks of Aristotelian elements as mixtures of more basic things, but why Anaxagoras thinks that Aristotelian homogeneous stuffs are not. Thus, neither text 1 nor text 2 gives an accurate picture of Anaxagoras's theory concerning the status of earth, water, air, and fire.[51] The only thing to conclude here, I submit, is that Aristotle has misunderstood Anaxagoras on this point.

49 See Essays 3 and 4.

50 This is doubly odd, because, if we apply Aristotle's definition of a homogeneous part to earth, water, air, and fire, it will appear that these too are homogeneous stuffs, and thus equally worthy to be called basic in Anaxagoras's systems, as Aristotle himself describes it. Aristotle apparently found parts of Anaxagoras's theory quite opaque (as do other commentators).

51 Other commentators have agreed that there is a problem with Aristotle's testimony here; see, for example, Vlastos ('Physical'); Sider (*Fragments*); Graham ('Reductionist'); and Lewis (15–16 n. 25). Schofield, who, among others, opts for the theoretical primacy of the opposites in Anaxagoras, has suggested that Aristotle is correct in thinking that earth and air are compounds, but mistaken in saying that the homogeneous stuffs are basic (*Essay* 161 nn. 51 and 54). In Essay 2 I argue that such an austere ontology (which restricts the metaphysically basic things to opposites) is not the correct interpretation of Anaxagoras. Whatever Aristotle's views about the so-called elements, he consistently maintains that the homogeneous stuffs are basic in Anaxagoras's theory.

Further problems are raised by Aristotle's mention of seeds and his use of the notion of a *panspermia*. The first difficulty is to determine what a *panspermia* is. The word is used fairly often by Aristotle in discussing atomism, and there is one place (text 2, above) where it occurs in his discussion of the status of earth, water, air, and fire in Anaxagoras's theory.[52] It also appears in Plato's *Timaeus*, at 73c1, where the topic is the creation of marrow and its role in the generation of other things.[53] In the *Timaeus* discussion, the marrow is said to be a *panspermia* for 'every kind of mortals.' This could mean either that it is a collection of seeds of all things (the seeds somehow being prior to the marrow), or that the marrow, as the source of all living things, serves as a sort of universal seed.[54] Although both meanings seem to be present in the texts in which Aristotle uses the word, he uses it most often in his accounts of atomism, as a way to explain how the single-natured atomic stuff can produce the elements and the homogeneous parts (to use his vocabulary). Moreover, Aristotle also often discusses the atomists and Anaxagoras in nearly the same breath, so we should not be surprised that he sometimes conflates their views, or uses language more appropriate to one to talk about the other. This suggests that Aristotle did not see a great difference between atomism and Anaxagoreanism, insofar as both theories begin with an unlimited number of principles or 'elements,' and both seemingly depend on a sort of universal stuff (atoms in the one case, the complete mixture of all things in the other) in their explanations of the cosmos. Anaxagoras's views can have contributed to this confusion; the doctrine of universal

52 A TLG search turns up eight instances of the word in the Aristotelian corpus: *de An.* 404a4; *Cael.* 303a16; *GA* 769a29 and 769b2; *GC* 314a29 (our text 2, above); *Ph.* 203a21; and *Sens.* 441a6 and a18. Three of these (in *de An.*, *Cael.*, and *Ph.*) occur in discussions of atomism; four more (the two in *GA*, and the two in *Sens.*) are parts of discussions of an unattributed view that the semen is a seed-aggregate; the last is our text 2 from *GC*.

53 This is its only occurrence in Plato. A.E. Taylor, in his commentary on the *Timaeus*, claims that 'the word [*panspermia*] is an old fifth-century one for a medley or "concourse" of minute "molecules" of different kinds.' He also says, 'As *spermata* is not a very suitable name for the molecules of atomism, it looks most probable that the original application of the word was to those [molecules] of Anaxagoras; possibly he used it himself. It would not be surprising if it were really older still, a genuine piece of early Pythagorean phraseology' (522). Taylor takes the two references to seeds in Anaxagoras (B4a and B4b) as Aristotle does, and he assumes that the Timaeus of Plato's dialogue was a real person, whose Pythagorean views Plato is faithfully reporting in the dialogue. Neither of these assumptions is well founded. I do not know what his evidence is for the antiquity of the word *panspermia*.

54 The latter seems to be the import of the translation in Brisson's edition: 'machinant une semence universelle pour l'espèce mortelle en son ensemble' (188).

mixture, which holds not only of the original mix, but also of all things now (B1, B4a, B4b, B12), entails that there is indeed a sense in which everything is a mixture (see Aristotle's testimony in A45). Aristotle presumes that the mixture must be such that anything and everything can come out of it (*Physics* 203a24–30); this might have suggested to him that the universal mixture contained fragments of all the ingredients, and, using atomism as his model, he calls these 'seeds.' The ancient commentators parted company with Aristotle on this interpretation of seeds in Anaxagoras.[55] I conclude that we should agree with the ancient commentators and discount Aristotle's interpretation.

55 For instance, in the testimonia in DK (other than the passages from Aristotle), 'seed' has its normal, biological sense (see Irenaeus A113, and Theophrastus A117). There are only two occurrences of the word *panspermia* in Simplicius (TLG search); both are in discussions of Democritus, with no mention of Anaxagoras.

2

The Original Mix and the Seeds

All things were together, unlimited both in amount and in smallness ... (B1)

2.1 The Original Mix

Fragment 1, which Simplicius tells us occurred at (or near) the opening of book 1 of Anaxagoras's *Physics*, contains an extraordinary series of claims: 'All things were together, unlimited both in amount (*plēthos*) and in smallness, for the small, too, was unlimited. And because all things were together, nothing was evident (*endēlon*) on account of smallness; for air and aether covered everything, both being unlimited, for these are the greatest among all things both in amount (*plēthos*) and in largeness.' Introducing B1, Simplicius comments that 'Anaxagoras says that the homogeneous stuffs, unlimited in amount (*plēthos*), separate off from a single mixture, everything being in everything, each being characterized by what predominates.' This suggests that B1 describes the state of things before *Nous* begins the rotation that produces the universe that we now perceive. Anaxagoras stresses that in this original state everything was mixed in such a way that no thing could be manifest or evident. (At this stage there were no observers, but the fragment emphasizes the impossibility of picking out anything even if there had been witnesses.) Two reasons for this impossibility are given. The first is the smallness of the things in the mix; the second is that air and aether were pervasive and thus obscured everything, much, one supposes, as fog or bright cloud can cover and obscure things in the world as we know it. Because Anaxagoras adopts the Eleatic rejection of coming-to-be and passing-away (as we saw in Essay 1), the original mixture must contain whatever is

genuinely real.[1] This is implied by B17: 'The Greeks do not think correctly about coming-to-be and passing-away; for no thing comes to be or passes away, but is mixed together and dissociated from the things that are. And thus they would be right to call coming-to-be mixing-together and passing-away dissociation.' Anaxagoras asserts that what human observers classify as coming-to-be and passing-away are merely rearrangements – through separation and mixture – of the basic entities, which are not themselves subject to coming-to-be or passing-away; these are the 'all things' that are 'together' in the original state. What are these things? The fragments and testimonia yield conflicting evidence, so any interpretation of the fragments will have to explain reports from later sources. There are three competing accounts of the basic things; I will call these the expansive, the austere, and the moderate interpretations. On the expansive view, everything that is in the world as we now perceive it (or which has emerged earlier or will emerge later) is in the original mixture; the austere interpretation limits the fundamental things to opposites; the third view steers a middle course.[2]

We might suppose that the impossibility of what-is-not and passing-away and the attendant rejection of coming-to-be entail that no genuine distinction can be made between what is metaphysically basic and what appears to the senses, so that whatever there is now must have been in the original mix. This would give Anaxagoras an expansive ontology; versions of this expansive view are endorsed by a number of scholars.[3] All these versions agree that the contents of the mixture are not to be thought of as ingredients. Thus, there can be nothing new that emerges from the original mixture and there is no difference between phenomenal and elemental things.[4] The expansionists claim that everything that will appear

1 The crucial exception is *Nous*, which begins and controls the rotation of the mixture. It is a basic entity, but it is not an ingredient of the original cosmic soup.

2 In what follows, I shall attribute these views to various modern commentators on Anaxagoras. Although there are differences among scholars in each group, it is the commitment to an overall account of Anaxagoras that places an interpretation in one group or another.

3 For instance, B17 explicitly rejects coming-to-be and passing-away. B3 asserts that what is cannot not be, and I take this claim to incorporate the impossibility of what-is-not (see Parmenides 28B2, 28B6, and the discussions in Essay 3). The expansive interpretation also adduces as evidence the question posed in B10 ('How can hair come from what is not hair?') and reports by Simplicius (*in Phys.* 460.4ff. = A45) and Aëtius (1.3.5 = A46). Proponents of the expansive ontology include Barnes, Furth, Graham (modified expansionism), and Guthrie.

4 Here is a representative statement of the expansive ontology: 'for [Anaxagoras] the only type of substance which can appear as a phenomenal substance is a substance which

in the sensible world is already in the original mixture and thus basic. Their argument depends on taking most of the items listed in the various fragments as basic things (although there is some disagreement about the list in B16); certain claims made by Aristotle, Simplicius, and Aëtius (especially in A45 and A46) are seen as offering support.[5] Individual human beings, other animals, and plants are in the mixture as seeds, and growth is merely a process of addition: hair is added to hair, bone to bone, and so on, through nourishment. When an organism absorbs nutrients, what it needs for sustenance or growth is extracted from the food – flesh and wood are both in water since both fleshy animals and woody plants grow and are nourished by ingesting it. So, when Anaxagoras says in B6, B11, and B12 that everything is in everything (except *Nous*) he means that there is gold in blood and in bread (or in wheat), flesh in gold and in hair, hair and arteries in bread (or wheat), fire in water and in gold, black in white and in bread, and so on with as many combinations and ingredients as one can think of.[6] Likewise, when he says that 'all things were together,' Anaxagoras denies that ingredients and sensible objects occupy different metaphysical levels. Not only are flesh, blood, the hot, the bright, and so on in the mix, so too are human beings, trees, and other natural objects. The seeds of B4a and B4b can be interpreted in various ways on the expansive view, as biological starting points for plants and animals containing some of everything, as miniatures of each living thing that will or could develop throughout all time, or as very small (but clearly they cannot be the smallest) fragments of each thing that is in the mix (so that there are

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appears as an elemental substance. Of course, this requires him to be much more generous as to what kinds of substance are elemental substances. But for him there will be no *new* substances ... In metaphysical jargon, there will be no emergent substances or supervenient properties.' Graham 'Postulates' 91. Given that Graham rejects the austere interpretation, and claims that there can be 'no emergent substances or supervenient properties,' 'substance' has a very wide sense for him. Barnes claims that the constituents of the original mix were 'stuffs' (which includes the opposites) (*Presocratic* 322ff.). Barnes's notion of 'stuff' is very wide: he rejects a proposal that neither bronze nor wine are in the original mix (326–30). Mourelatos ('Quality') also endorses an expansive view, but for reasons that have to do as much with the emergence of *qualities* (such as sweet) as with the emergence of *things* (such as cheese). In conversation, István Bodnár suggested that we could call the expansive view an 'anarchic' interpretation, as it allows everything in the original mix and forbids nothing.

5 These testimonia deal especially with nutrition and growth. On the role of these processes in influencing interpretations of Anaxagoras, see Schofield 'Doxographica' and *Essay* 136–43.

6 Is bread in the original mix or only wheat? On the expansive view, one might think that it should be bread that is present.

seeds of hot, of cloud, of blood, and so on).[7] The expansive view takes seriously the notion that Anaxagoras sought to explain the natural world without recourse to genuine coming-to-be and passing-away (just as he himself says in B17).

The expansive view, an exuberant and robust commitment to the denial of coming-to-be, seems to accord with Anaxagoras's embrace of Eleatic strictures against the reality of coming-to-be, passing-away, and change. Nonetheless, some scholars, arguing that the expansive ontology is not consistent with all of the fragments, or that it places an undue emphasis on the processes of growth and nutrition, have proposed that Anaxagoras actually adopts a parsimonious or austere ontology, accepting only the opposites as genuinely real, and reducing all other things to bundles or collections of the opposites.[8] On this view, Anaxagoras develops a theory of primary basic and real ingredients (opposites) and secondary mixtures that are reducible to those ingredients in order to give a metaphysically acceptable explanation of the phenomena of perception. The objects of the sensible world are temporary mixtures of opposites, either directly or through the intermediates of earth, air, fire, water, flesh, bone, and so on, which are themselves mixtures of opposites in varying proportions. There is a fundamental metaphysical difference between phenomenal objects and the ingredients of those objects. Opposites are the ingredients of everything else and only they are genuinely real; perceptible things are temporary mixtures of opposites and are not genuinely real.[9] In the

7 See Reeve, for instance. There is disagreement about the role and status of seeds even among proponents of the expansive view.

8 See Tannery, Vlastos ('Physical'), Schofield (*Essay*), Inwood. Schofield maintains that Anaxagoras' ontology grows out of metaphysical commitments rather than theories of nutrition; he has come to be identified as a proponent of the austere ontology. Yet, in the last pages of his *Essay*, Schofield suggested that the austere ontology might not be Anaxagoras's view. In line with this, Schofield has since modified his view; see both his article on Anaxagoras in Zeyl and his 'Other Worlds.' Schofield continues to maintain that the opposites do the explanatory and causal work for Anaxagoras, but adds that Anaxagoras may not have distinguished clearly between different ontological levels in his theory.

9 Here is one account (from Schofield 116): '[T]he sensible world can be described completely and adequately in terms solely of opposites; ... any other ways of describing the world – e.g. by using sortals and mass terms – are parasitic on the vocabulary of opposites, and are to be treated as introducing nothing but epiphenomena, or logical constructions out of opposites. Such a position lies close to the perennially attractive view that the external world presents itself directly and fundamentally only in the form of sensible qualities. It adds the idea that sensible qualities always fall within quality ranges which are specified in terms of opposites – the hot and the cold, the wet and the dry, and so on.'

austere ontology, because only opposites are efficacious in change and do the explanatory work, only they are basic. B15 is a crucial text for this interpretation; it is interpreted as asserting that the Earth (and earth in general) is no more than a collection of opposites, as is aether: 'The dense and the wet and the cold and the dark came together here, where <the> earth is now; but the rare and the hot and the dry <and the bright> moved out to the far reaches of the aether.' Earth and aether are perhaps constituted by more opposites than those listed in B15, but they are nothing over and above the opposites. According to the austere interpretation, the crucial claim that 'there is a portion of everything in everything' means that all the opposites are inseparably in everything, and this claim is supported by B8's assertion that the hot and the cold cannot be hacked apart even with an axe. Thus, the claim at the end of B12 that each thing is that which predominates refers to the differing proportions of all the opposites that combine to yield the natural objects in the perceptible world. So the remarks about air and aether in B1 and B2, and the mentions of seeds (with many forms, colours, and flavours) and earth in B4 and B4a, refer to later stages in the development of the rotating cosmos, when these stuffs have been produced by the mixture or compounding of the opposites as they separate off from the original mix.

2.2 A View between the Expansive and Austere Ontologies

There are good reasons to think that neither the expansive nor the austere interpretation is the correct account of Anaxagorean metaphysics. There is a third alternative that seeks to find a middle way between the two. On this ontology, there is a distinction between the basic ingredients and the secondary things that emerge through the mixture and separation of these ingredients, just as on the austere interpretation. Nevertheless, unlike the austere view, the moderate interpretation does not reduce sensible things to opposites and treats as ingredients not only the opposites but also other stuffs, such as earth, air, aether, flesh (all mentioned in the fragments), blood, bone, fire, water, copper, gold, and so on. On this view, the list of basic entities is more inclusive than it is on the austere interpretation. Nevertheless, we should not adopt the expansive view: Anaxagoras's texts show that natural objects in our world (human beings, dogs, trees, and the phenomenal instances of earth, air, fire, water) are mixtures of the basic ingredients, and this means that they are not genuine entities, but temporary emergents.[10] These natural objects are not real, thus shortening

10 These mixtures are intermediate between the fundamentally real ingredients that are in the original mix of B1 and such obvious artefacts as houses and bronze, which

the list associated with the expansive view. We can begin to defend this moderate view by considering objections to the expansive and the austere interpretations.

The expansive view gives Anaxagoras a generous ontology. Some may judge it bloated and argue that it should be rejected solely on these grounds, but metaphysical liberality is not a conclusive reason to reject the expansive view as an interpretation of what Anaxagoras held. Contemporary philosophers rightly prefer to eliminate redundancies from philosophical systems, but, unlike us, ancient philosophers did not always regard ontological parsimony as an overriding virtue. Nonetheless, one difficulty in evaluating the expansive view lies in understanding what it posits as the basic entities of Anaxagoras's system. The expansive ontology draws its strength from the 'everything in everything' principle that occurs often in the fragments, and this certainly is a fundamental part of Anaxagoras's system; but until we know what 'everything' encompasses (and until we can make sense of the claim itself), we cannot appeal to that slogan as support for the expansive view. Most of its proponents acknowledge that some things are artefacts, but are unclear about where to draw the line between them and natural things.[11] Some more recent commentators apparently want to include artefacts in the original mix.[12]

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require human agency for their production. Biological things are generated from seeds, understood as fundamental ingredients containing material for the nourishment of the developing organism and organizing principles for it (more of this below). This view is similar to the one proposed by W. Mann, but differs from it in certain ways, and especially in the treatment of seeds.

11 Rather like Anaxagoras, I am going to talk about 'things' here – Graham speaks of substances, as do a number of other commentators. I want to avoid that word, not only because it is anachronistic in discussions of the Presocratics, but because it is also potentially misleading. 'Substance' has the suggestion of something basic and not subject to change (an *ousia* in the Aristotelian sense), and that begs the question here, where we are trying to determine just what are the basic entities or beings of Anaxagoras's system.

12 Although he does not address the issue of artefacts directly, Barnes's examples of Anaxagorean stuffs (that were, presumably, in the original mix) include wine, cheese, and smelted metals. Barnes raises the issue in terms of ingredients and compounds: 'I conclude that Anaxagoras' theory takes no stand on the question of elements; it has no peculiar resistance to them; and it provides no special place for them. The contrast between element and compound is of secondary interest to the theory' (*Presocratic* 327). B17 does seem to mark a distinction between ingredients (if not elements) and compounds. Moreover, the problem is not merely one of compounds, but of particular sorts of compounds, namely, artefacts, and Barnes does not seem to address this issue. Some adherents of the expansive view (Peck, for instance) omit 'inorganic substances' from the list of original entities, but I can see no reason why they should

Certain things (houses, cheese, pots, iron axes, etc.) are the products of human activity and thus can be said to come to be as the result of human manipulation of natural entities. This is a natural reading of B4a, which claims that 'elsewhere' there are 'cities that have been settled by humans and works made just as with us.' Just what Anaxagoras means by 'elsewhere' is discussed in Essay 5, but the relevant import of the claim is that human beings build or settle cities and that they manufacture goods for themselves. In these cases, it is certain that the ingredients for the artefacts are the sensible materials that we perceive around us (wood to become lumber, mud to become bricks, the ores that are smelted into bronze), and that the changes in them are caused by human agency. Yet, on certain versions of the expansive view, artefacts are emergent things; thus, consistency demands that they, too, must have been in the original mixture. Perhaps we might think that bronze could have been in the original mix, or even cheese, but could Anaxagoras have thought that works of art or tools and implements were included in the original mixture, when 'all things were together'? It would seem that Anaxagoras must acknowledge that statues, houses, and plows (as well as cheese, soup, and bread) are artefacts.[13] Like the natural things, they are mixtures of all things, with certain ingredients predominating; but the predominant ingredient is not cheese, soup, bread, house, plow, or statue. 'Soup' is the name we give to a certain mixture with a certain texture, and the sort of soup it is is determined by whether the main ingredient is chicken, tomato, bean, or whatever, and how those ingredients are arranged (chunks, minced, creamed, etc.). In the same way, a statue is wood or marble because of its predominant ingredient, and is the statue it is because of its shape or form, with its predominant ingredient and shape chosen by the artificer. We can also extend the analysis to the ingredients themselves. Chicken soup may have chunks of chicken in it,

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do so. Furth wants to leave human artefacts out of the picture, but seems to think that Anaxagoras's 'official view' should be that they are in the original mix: 'It is probably best to understand [Anaxagoras's theory] as concerned mainly with natural changes and [coming-to-be], and to leave aside – i.e. forget about – the artefactual comings-to-be brought about by carpenters and cooks. It will not do to just say ... that it is "absurd" that the original Mixture had Bread in it; according to the theory, it is necessary, if Bread ever (in mortal talk) comes-to-be' (Furth 'Hero' 106 n. 12). In correspondence, Graham clarifies his own position this way: 'I am inclined to think that all homoeomerous things, i.e. stuffs typically expressed by mass terms, are included within the [basic things]; so, that would include bronze and cheese, but not chairs, dogs and cats.'

13 It might seem that this is a side issue, but the status of artefacts is related to that of the things in the world that appear to be subject to coming-to-be and passing-away (which Anaxagoras discusses in B17).

but it will also include chicken broth, itself a contrived item made from a number of ingredients. Bronze is a mixture of copper and tin (themselves mixtures in which copper and tin predominate). We don't call it 'bronze' because there is more bronze than anything else in it; we call it 'bronze' because that is the name we give to such a mixture in which copper and tin are combined in a certain way, just as 'ratatouille' or 'chicken soup' are the names we give to mixtures of certain ingredients in certain proportions and combined in particular ways. In all these cases, the structure and the ingredients are determined by the artificer, a human being.[14] Bronze and ratatouille should not be taken to be part of the mix as it was in the state described by B1, and so there is a limit on the scope of 'all things.'

The expansive view aspires to be consistent with the Anaxagorean texts and to take seriously the assertion that there is no coming-to-be or passing-away; but B17 offers evidence that the expansive interpretation of 'all things' cannot be the right one (even were its proponents to accept that artefacts are not in the original mix). In B17, a text that is often underestimated by commentators, Anaxagoras makes clear that the phenomena that everyday folk call coming-to-be and passing-away are really the mixtures and dissociations of basic things that are genuinely real in the Parmenidean sense. I take it that mixing and dissociation are genuine processes of rearrangement for Anaxagoras and not just empty names. That is, what looks like genesis is not a coming-to-be from what is not, from nothing, but it is an emergence (however temporary) of something through the combination of previously existing materials. The emergent thing just is certain ingredients rearranged through mixture (which is the dissociation of some prior arrangement). So, while there is something that seems new as an item in the phenomenal world, this is not a sudden appearance of something from nothing; nor can we say that something genuinely real and new has appeared. Passing-away, too, is a normal and acceptable process when it is understood, not as the mysterious disappearance of the destructed thing into nothing, but simply as the dissociation and rearrangement of the component ingredients of something that was a temporary emergent in the first place.[15] This process is obvious and

14 While it is true that the structure of an artefact can be affected by the ingredients (wood behaves in certain ways and not others), the overall structure is ultimately determined by the artificer.

15 Provided that we do not think that these processes are real (in the Eleatic sense), we might continue to use the words 'coming-to-be' and 'passing-away.' Empedocles, who like Anaxagoras denies the reality of coming-to-be and passing-away, allows for a use of the words, with the proviso that these are shorthand terms that can be misleading to the philosophically naive or uninitiated (see 31B9); see also Plato *Phaedo* 71b and 102b.

understandable in the case of artefacts. When I put together (combine or compact, in Anaxagorean terms) pieces of wood to make a table and then dissociate its parts so that I can reuse the wood to make a bench or bookshelf, I can say that the table comes-to-be and then is destroyed, but I do not think that I have produced a table from nothing and that it disappears into nothing. A table just is an impermanent mixture; it is its ingredients arranged in a certain way. The coming-to-be of a house is rather more complicated, but the principle is the same. Similarly, bronze, wine, and bread are human artefacts; fire, copper, grapes, water, and wheat are not.

As noted earlier, B4a suggests that Anaxagoras recognizes that human artefacts are in a different class from objects in the natural world ('. . . there are cities that have been settled by humans and works made, just as with us'). The language in B17 and B4a of compounding, mixing, and dissociating suggests that for Anaxagoras, much of the world reported by the senses is a world of temporary emergences, some of which are what we might oxymoronically call 'natural artefacts' (B4a: 'Human beings and also the other living things are compounded [*sumpagēnai*], as many as have soul'). They are artefacts because they are temporary compounds of the basic entities, subject to coming-to-be and passing-away as they are properly understood; they are natural because their compounding and dissociation are not the result of human manipulation. If we do not adopt such a view, we cannot account for the mention of both mixture and separation in B17, or the compounding in B4a. The ingredients themselves are (are genuinely real), and combine to produce the furniture of the phenomenal world. And 'furniture' seems an appropriate image here – for the phenomena are natural artefacts, put together by nature (guided in the long run by *Nous*), and subject to falling apart just as human-made artefacts are. Each natural organism is a mixture, produced by the combinations of its ingredients; in nutrition the organism is broken down and its ingredients remixed. In a similar way, the various phenomenal forms and instances of earth, water, air, and fire (stone, rain, cloud, lightning) are also mixtures that can change through the cycles of compounding and separation (as B16 suggests). Thus, the processes of the natural world can be explained within the strictures of Eleatic metaphysics. This is the natural interpretation of B17, and it is clear that B17 enunciates a fundamental principle for Anaxagoras; yet many versions of the expansive ontology fail to take proper account of it. On the expansive interpretation, the only relevant process seems to be emergence (through expansion or enlargement) from the background of the organism as a whole; thus the claim that Anaxagorean seeds are very small versions of the com-

plete organism. But this account ignores the work to be done by Anaxagoras's processes of mixing, compacting, and separating.[16] The problem is a reluctance to suppose that Anaxagoras thought that the ingredients of natural artefacts, as I have been calling them, are genuinely real, while those natural artefacts themselves are not, because they are metaphysically dependent and not basic. How can Anaxagoras's world allow for natural things and organisms that are only apparent and not genuinely real? As one commentator puts it, 'Anaxagoras is committed to the existence of the ... parts of substances, bone, hair, and the like. It would be perverse to believe in the existence of hair, but not in the existence of anything hairy!'[17]

Part of the difficulty stems from the way that the problem is posed: it is first presented in terms of the existence of sensible objects and organisms, and then tied to Anaxagoras's rejection of coming-to-be and passing-away in B17. Barnes clearly links the disavowal of coming-to-be and existence:

> Generation and existence are connected by the tightest of conceptual bonds: to be generated is to come into existence; if *a* is generated at *t*, then *a* exists immediately after *t*. Thus anyone who holds that '*a* is generated' is always false must maintain that '*a* exists' is true only if *a* is eternal – ungenerated and indestructible. Now philosophers, evidently, are not eternal; nor can they be generated, according to Empedocles and Anaxagoras: hence no philosophers exist. Do men, horses, trees, clouds, chairs, books exist? Empedocles and Anaxagoras must answer: No. As far as we know, Anaxagoras did not recognize this consequence of his views.[18]

We can begin to solve the problem by noting that this account reduces the complex issue of the metaphysical status of entities at various levels in the theory to the single question 'Does X exist or not?' It is misleading to formulate Presocratic accounts of what there is primarily in terms of

16 Furth, for instance, suggests that B17 contains a mistake on Anaxagoras's part; taking the fundamental mechanism in Anaxagoras to be emergence from the background mixture, he suggests that mixture and separation are inconsistent with emergence as mechanisms on the phenomenal level. Furth calls the presence of mixture and separation in B17 'a bad problem.' He points out that Strang had already noted the apparent conflict, and denied that there was a serious problem. Lewis, about whom I shall have more to say when I discuss seeds, also underrates the importance of B17. He notes that on his view of seeds (that they are homunculi) organisms are eternal, and then notes that destruction becomes a serious problem. (Seeds are homunculi, Lewis 1, 18–23; eternity of organisms, 17; problems with destruction, 21 n. 36.) On Lewis's view, too, one suspects, Anaxagoras should not have written what he did in B17.

17 Lewis 16 n. 26; see also p. 14.

18 Barnes *Presocratic* 442.

existence. 'What exists?' was not the fundamental question.[19] As we have seen (in Essay 1), Parmenides had raised the problem of what is *real* in terms of what can be known in the strictest sense, and his answer was to set out the criteria for what-is, rather than to give a list of genuinely real things. In the arguments of B8, Parmenides lays out a map pointing to the nature of what is genuinely real. Using his map in the right way, following out the arguments, judging by *logos*, we can arrive at our own list or account of what there is, and we might be quite surprised by what does (and what does not) turn up on the list of what is metaphysically basic. Anything that is genuinely real ('really real' – an *ontōs on* – as one might say in Greek) will indeed exist, but that is not the most interesting thing about it, and it is not of existence per se that Parmenides gives an account. Moreover, other things appear in the world of the senses, things that we might well talk about by saying that they *exist*; but because they do not satisfy the Parmenidean criteria, we cannot say that they are *real*. Thus, for Parmenides and Anaxagoras (should they formulate the question this way), the list of what exists is longer than the list of what is real. Natural (and human-made) artefacts are not illusions (not even the contents of the world of Parmenides' *Doxa* are that), but they are apparent and not real things. So what should we say about philosophers, trees, and horses on Anaxagoras' view?[20] They (along with all the other natural artefacts such as individual organisms and such natural features as rock formations and clouds) are emergents from the background of 'all things' (all basic things), and result from the mixtures and separations of various ingredients. They can be seen and analysed, but they are temporary emergents and thus not real. They are mixtures that emerge and that will dissociate, and therefore in Anaxagoras's special sense they both come to be and pass away. What is genuinely real are the ingredients that mix and combine when these natural artefacts are compacted or compounded.

Some version or other of the expansive ontology seems to have been the preferred interpretation in antiquity. More recently influential commentators have argued for the austere Anaxagorean ontology. Proponents of the austere or reductionist interpretation have differed in their reasons for adopting it, but all have agreed that by distinguishing between basic ingredients (the opposites) and those things constituted by them, Anaxagoras can explain certain processes of change, such as the change of cloud

19 See Kahn 'Existence'; Mourelatos *Route* and other works; and Curd *Legacy*, chapters 1 and 2.

20 Books and chairs, also mentioned as problems by Barnes, are the results of the arrangement of ingredients by human beings. They simply and straightforwardly have 'second-level' status, and clearly are not real in the relevant sense.

to water to earth (as in B16), the growth and nutrition of living organisms, or the apparent coming to be and passing away of natural objects (as in B17).[21] The interpretation draws textual support from B15: 'The dense and the wet and the cold and the dark came together here, where the earth is now; but the rare and the hot and the dry <and the bright> moved out to the far reaches of the aether.' The fragment can be read as saying that earth itself is formed from dense, cold, wet, and dark stuffs, that is, that it is put together or compounded from those opposites (and perhaps others). Further support is found in B12, where the revolution begun by *Nous* is said to separate 'the dense from the rare and the warm from the cold, and the bright from the dark, and the dry from the moist,' and in B4b, where Anaxagoras gives what looks like a partial list of original ingredients when he says that 'the mixture of all things' prevented even any colour from being manifest. This inventory is dominated by opposites (although it does not consist exclusively of these, as both earth and seeds are also on the list).[22] On the austere ontology, earth (despite its mention in B4b) and aether (despite its appearance in B1 and B2) are not basic things for Anaxagoras, but are dependent entities that can be reduced to opposites (mixed in certain ratios, perhaps).[23] Some proponents of the austere ontology have also relied on a passage in Simplicius (*in Phys.* 44.1–10), where Simplicius says that for the Anaxagoreans homogeneous stuffs have characters that

21 Proponents of the austere ontology include Tannery, Burnet, Cornford, Vlastos, Schofield (but see note 8, above), and Inwood. There are important differences among the various versions of the austere ontology. There are also different reasons given for adopting it. Some versions (such as Cornford's and Vlastos's) stress central roles for growth and nutrition in Anaxagoras's theory (this is especially true of Cornford) and argue for a specialized and technical character for seeds in the system. This issue plays a much smaller role in later versions of the austere ontology. Schofield, for instance, rejects nutrition and growth as playing a fundamental part in Anaxagoras's thought, arguing that Anaxagoras is motivated by metaphysical considerations that can be traced to Parmenides. For a careful discussion of the main tenet of the austere ontology, that only the opposites count as basic entities for Anaxagoras, and arguments against it, see Graham 'Reductionist.'

22 See also B8, where Anaxagoras insists that 'the things in the one world-order have not been separated from one another, nor hacked apart with an axe.' He uses opposites as his example: 'neither the hot from the cold nor the cold from the hot.'

23 Two passages in Aristotle are also cited as evidence: *Cael.* 302 a28ff. and *GC* 314a28ff., where Aristotle says that Anaxagoras makes homogeneous stuffs elements and that air and fire and water are compounds, mixed together from these simple things. For discussion of these passages, see Essay 1. B10, with its mention of hair and flesh, would seem to be counter-evidence to the austere view, and Schofield originally argued against the authenticity of B10 (see 'Doxographica'). Although he later accepted it as perhaps 'Anaxagorean,' he still doubts its importance as a crucial text for Anaxagoras's system (see *Essay* 106–107, 133–43).

are determined by the opposites in them.[24] Similarly, at 178.33ff., Simplicius, who quotes part of B12, B15, and B16 at this point, conjectures that perhaps when Anaxagoras writes of the revolution [described in B12] separating 'the dense from the rare, the warm from the cold, the bright from the dark, and the dry from the moist,' he might be making what Simplicius calls the simple and archetypical things elements. Although these passages do not unequivocally assert that only the opposites are basic, they might be read as supporting that view.[25] Finally, advocates of the austere ontology note that Theophrastus reports that for Anaxagoras, perception occurs by means of the opposites (A92: 'Anaxagoras says that perception occurs through opposites, for the similar is unaffected by the similar').

For the austere ontology, the opposites alone are causally efficacious and do all the explanatory work in the theory. Thus, everything else can be reduced to opposites, which are the ultimate ingredients. As one supporter puts it:

> [C]hange, according to Anaxagoras, is a matter of the redistribution of ingredients. Anaxagoras' idea will be that in a rotation, dense, wet, cold and murky ingredient stuffs cause whatever they dominate to adopt forms which manifest their presence in ever greater concentrations, unless they are checked by other forces. Secondly, insofar as Fragment 15 (and indeed the reference to the separation of opposites in

24 Simplicius is commenting on Aristotle's *Phys.* 184b20–22. In this passage Aristotle says that if the principles are infinite, then they must be either one in kind, as the Atomists say, or 'different in form and even contrary.' The passage is difficult; Simplicius is agreeing with Porphyry and Themistius against Alexander of Aphrodisias that, in this part of the *Physics*, Aristotle is referring to Anaxagoras as well as to Democritus. Whatever we make of the argument among the commentators, it does seem clear that Simplicius is here suggesting that Anaxagorean basic entities have characters determined or differentiated by opposites. The passage is complicated by Simplicius's inclusion of 'homogeneous stuffs' as Anaxagoras's basic principles; it is just for this reason that Cornford relies on this passage, for he thinks that Anaxagoras adopted the principle of homoiomereity. For reasons to reject Cornford's view, see Mathewson, Graham ('Postulates'), and the discussion in Essay 1.

25 Cornford ('Matter') and Vlastos ('Physical') so read them. Schofield does not cite the first passage for support, although he refers to *in Phys.* 178.33–79.12, where 'Simplicius raises the possibility that it was just the simplest opposites which Anaxagoras made his elements' (*Essay* 161 n. 9). Elsewhere, Schofield questions Simplicius's reliability: 'We cannot trust Simplicius, for probably he did not have Anaxagoras' book available to consult, only extracts from it' (159 n. 36); he gives further arguments in 'Doxographica.' The second passage (178.33ff.) is quite difficult, and there is little agreement among commentators about just what it means. Stokes suggests that Simplicius is attempting to say that, for Anaxagoras, the opposites function as elements, but he also argues that even Simplicius himself does not seem to think there is sufficient evidence to state this unequivocally ('Order' 235–37).

Fragments 8 and 12) suggests a general and fundamental pattern of change, then ingredients which are opposites, or are called by the names of opposites must be recognized as playing a more general and fundamental causal role in Anaxagoras' physical theory than any other sorts of ingredient he may have envisaged – e.g. . . . ingredients bearing the names of specific stuffs, such as 'gold' or 'flesh.'[26]

Despite its attractions, the austere interpretation faces serious difficulties, and I will conclude that what is fundamental for Anaxagoras must extend beyond the opposites. First, the principle of homoiomereity, which motivated some earlier versions of the austere ontology, is not an Anaxagorean principle. There is no reason to claim that, despite the evidence of the texts, earth and air and fire are *not* in the original mix.[27] Second, the fragments themselves refer to more things than just opposites, and in ways that treat opposites and other stuffs as having equal standing in the theory. B1, which describes the state of things before *Nous* originates the separating motion, says that air and aether covered everything; thus, they cannot have been compounded by the mixture of opposites. They must have been in the original mix even before the beginning of the rotations that give us compound things. B4a mentions seeds ('since these things are so, it is right to think that there are many different things present in everything that is being combined, and seeds of all things, having all sorts of forms, colours, and flavours'), and although the verb is in the present, I think the suggestion is clear that seeds were part of the original mix, because the things that 'are being combined' are combined from the primary ingredients. In B4b Anaxagoras says that 'before there was separation off, because all things were together, there was not even any colour evident; for the mixture of all things prevented it, of the wet and the dry and of the hot and the cold and of the bright and the dark, and there was much earth present and seeds unlimited in number, in no way similar to one another.'[28] There is no indication that earth and seeds were present in that mixture of all things in a dependent way, as epiphenomena of the opposites, or that they

26 Schofield 114–15 (italics omitted). It should be noted that Schofield's view differs from that of Vlastos, in that Schofield ultimately recognizes two levels of ingredients: fundamental ingredients (the opposites) and further ingredients ('air, earth, water, and seeds') which are derived from the fundamental ones. These further, secondary, ingredients then combine to produce the things in the natural world. See *Essay* 132–33.

27 See Essay 1.

28 Schofield takes the claim in B4b to mark a distinction between primary and secondary ingredients, with the opposites being primary; see *Essay* 133. Some proponents of the austere view read the 'and' (καί) here epexegetically. There is no compelling reason to do so (other than a prior commitment to the austere ontology). See the notes on B4a and B4b.

are reducible to them. There are many opposites in the original mixture, to be sure, but also earth and aether and air (and water if B16 is discussing original items, though B16's status as a cosmogonical fragment is shaky). B10 adds hair and flesh to the list.[29] The testimonia suggest other items. The red-hot metal that composes the sun (and is mentioned numerous times in the testimonia – A1, A2, A19, A20a) was probably in the original mix. Aristotle mentions his own homogeneous bodies (including flesh and bone and marrow, A43, A46), and in book 1 of the *Physics*, where he is contrasting the first principles of Empedocles and Anaxagoras, says that for Anaxagoras both the homogeneous stuffs and the opposites are infinite. Theophrastus cites gold and water in addition to fire (A41). Finally, there are the ingredients connected with nutrition and growth: flesh, blood, bone, sinews, and so on (these appear not only in the context to B10 but also in A46).

Nevertheless, we might still find the austere ontology attractive because of its effectiveness in explaining change and because of the fundamental role that Theophrastus assigns to opposites in his account of Anaxagoras's theory of perception. If the opposites do all the explanatory work in the theory, Anaxagoras would have a good reason to reduce all other qualities and characters to them. In response, we can first question whether, as a matter of fact, the opposites have such an exclusive role for Anaxagoras; further, we note that even if we grant an important explanatory role to opposites, that may not justify the ontological reduction of everything to opposites.

Let us begin with the explanatory role of the opposites. Commentators who have adopted the austere ontology have given few examples of just how Anaxagoras is supposed to explain all apparent changes by an appeal to opposites. Consider what Schofield says about B16: 'The causal sequence [Anaxagoras] describes in Fragment 16 implies . . . that water, for example, is in essence nothing but stuff in which the dense, the wet, the cold, and the murky predominate – to a greater degree than they do in clouds, but less than in earth or stones.'[30] The talk of 'predominance' is certainly Anaxagorean, but how do we determine which opposites predominate in particular cases, and how do we determine which ratios are relevant? We can understand what it would mean to speak of flesh being dominant in a given location; but what about hot? Because so many different things can

29 The claim that the list includes more than the opposites does not depend exclusively on B10 (although I think that B10 gives us a report that is genuinely Anaxagorean). One can suppose that Anaxagoras's main concerns were metaphysics and rational cosmology, rather than nutrition and growth, and still see an important Anaxagorean point in B10.

30 Schofield 116.

be said to be hot and in so many different comparative degrees of heat, the appeal to hot alone does not offer enough explanatory force. We need to know what kind of stuff is hot, and this will not be determined merely by appeal to opposites.

Further, it is not clear, on this view, how we would distinguish between what later philosophers call qualitative changes in the same thing and changes that result in the apparent passing away of one kind of thing and the coming-to-be of another. This kind of objection to Presocratic theories is voiced as early as Aristotle. I am not claiming that Anaxagoras is immune to such criticism; but I am arguing that he could avoid the problem by including flesh, blood, gold, and so on in his list of natural ingredients. Certain sorts of flesh may be 'red, soft, heavy, etc.' as one supporter of the austere ontology says.[31] Nonetheless, a particular bit of flesh also has a certain temperature, and not only does the temperature of different sorts of flesh vary (human vs canine vs snake vs arctic fish), but within a particular sort, there will be variations among the well and the diseased.[32] A creature with a fever has hotter flesh than normal; if the fever is high enough (i.e., if enough hot is added to the mixture), the creature may die (disintegrate, dissociate as B17 would have it), but the flesh remains. Roasted flesh is still flesh, though the temperature is far outside the normal range for the living creature; and it may no longer be red, nor soft, nor quite so heavy.[33] An attempt to give the full reduction that the ontology requires would surely be quite challenging: earth, to be sure, is wet and cold (except when it is sand or lava), but it is also earthy, and this seems difficult to reduce to a set of opposites.[34] The difficulty of performing such a reduction is not a conclusive reason to reject the view, but it does call it into question. That Anaxagoras thought that earth (and other natural things) could not be so reduced is, perhaps, indicated by the mention of earth in B4b, and of air and aether in B1 and B2, and by the repeated uses of nutritional examples in the doxography, following B10. Hair and flesh are nourished by hair and

31 Vlastos ('Physical' 322) refers to flesh: 'Flesh has any number of qualities: it is red, soft, heavy, etc. Given these powers in the required ratio, the result would be flesh.'

32 There are also important variations in qualities among different types of flesh (ostrich, chicken, salmon, sole). See Diogenes of Apollonia DK 64B5, who says that while all animal souls (which are air) are hotter than the air external to them (but colder than the air near the sun), different animals are characterized by different levels of heat. Diogenes attributes their differing shapes and habits to differences in heat.

33 Cf. the wax experiment in Descartes's *Second Meditation*.

34 Differences between kinds of earth might be characterized in terms of opposites. This would account for Simplicius' claim that, for Anaxagoras, homogeneous stuffs are differentiated by opposites (*in Phys*. 44.5–10). Yet, such a claim is also consistent with the intermediate ontology that counts hair, flesh, wood, air, and so on as basic.

flesh, not by the opposites directly. It is simpler to accept the presence of earth, air, and aether as basic ingredients than *first* to explain them away and *then* to go on to show how natural things are to be explicated by an enumeration of opposites and distinguished from one another simply by slight differences in opposite ingredients. The austere ontology with its reduction to opposites does not, then, make explanation of the fragments easier or more economical, and when we give up the conviction that it does, we can read the fragments without having to explain why earth, aether, air, hair, and flesh (along with the other things mentioned by the testimonia) should not be counted among the basic things. There are good metaphysical reasons for including them on the list of what is genuinely real, for they are the proximate ingredients from which the natural artefacts are compacted, and even if the compounding or mixture can be serial (as B16 indicates, and as Simplicius says in defence of Anaxagoras against Alexander in the context of B13; *in Phys*. 300.27–31), Anaxagoras needs these ingredients to be genuinely real.[35]

Finally, proponents of the austere ontology might find support in Anaxagoras's theory of perception.[36] Theophrastus reports that 'Anaxagoras says that sense perception occurs through opposites, for the similar is unaffected by the similar' (A92). When I perceive, I am aware of sweet or dark or hard because they differ from the present state of my perceptual organs.[37] If my hand is the same temperature as the brow that I touch, it does not feel feverish to me; the dark and light in the bark of a tree registers as something different from the surroundings and from the present state of my eyes (as Theophrastus reports, 'Sight occurs through a reflection in the pupil of the eye; there is no reflection in something of the same colour, but rather in what is of a different colour'). The opposite qualities are in the thing perceived and also in me; but whether the flesh of my hand or the bark of the tree is reducible to a collection of these and other

35 In both 'Postulates' and 'Reductionist' Graham has also argued that Anaxagoras' use of the notion of manifestness sits uncomfortably with the austere reductionist view. When Anaxagoras says (in B1) that 'nothing was evident on account of smallness' and suggests that when the action of the rotation causes things to become manifest, it is most natural to read the claim as saying that it is such things as air, fire, earth, blood, bone, and so on that become clear or evident. These ingredients then are mixed (as in B17) when 'humans and also the other animals were compounded, as many as have soul' (B4a). See also Schofield's *Essay*, where, after defending the austere ontology, he acknowledges that the evidence is difficult and accepts the possibility that the austere ontology was not Anaxagoras's view (see 141–44).

36 David Sedley has made this claim to me. (See also Betegh's discussion, 289 with n. 55.)

37 This difference is probably the source of the claim that for Anaxagoras all perception is accompanied by pain or distress. See the discussion of perception in Essay 5.

opposites cannot be determined simply by examining the mechanism of perception. My flesh can contain hot and cold (and other opposites) without thereby being reducible to or identical with a collection of opposites. Both the austere reductionist ontology and the moderate view are consistent with such an account of perception; so, Anaxagoras's account of perception cannot by itself decide the question of the metaphysically basic entities in Anaxagoras's ontology.

Although its metaphysical economy is appealing, there are good reasons to think that Anaxagoras did not adopt the austere ontology. Nor, as we have seen, did he opt for the expansive view. Rather, his ontology includes such things as air, aether, flesh, hair, gold, metals, and so on. Naturally occurring phenomenal objects are temporary mixtures of these ingredients, compounded of them through mixture and the breaking up of other compounds, just as B17 says. These natural artefacts are not genuinely real, but are dependent entities; as temporary mixtures, they are knowable only through the ingredients that constitute them. This moderate view agrees with Anaxagoras's texts, and hence, on that ground, is preferable to either the austere or the expansive interpretations. There is also a good philosophical reason for attributing it to Anaxagoras. Although the moderate interpretation may seem extravagant or random in its variety of basic ingredients, it allows Anaxagoras to provide systematic accounts of the world that we inhabit. Claiming that only the ingredients and the opposites are real and regarding the biological, meteorological, and cosmological items as natural *artefacts* allows Anaxagoras to explain our experience of the appearance of the coming-to-be, passing-away, and development of various entities, and to explain their phenomenal properties. In this he recognizes different levels of metaphysical and scientific explanations, with properties and characteristics maintained at one level and transferred to another even while the structural complexity of an entity or organism increases. Similarly, Aristotle begins with the elements earth, water, air, and fire, which combine to form the Aristotelian homoiomerous stuffs (flesh, blood, bone, etc). From these are formed the anhomoiomerous parts (limbs, organs), which, in turn, are the parts of living things. At each hierarchical level of explanation, there is a combination of stuffs and properties: fire is hot and dry; flesh has various ranges of properties; dogs have yet another range. Aristotle adopts this view because it gives the best unified explanation of how the basic stuffs underlie all the objects of the natural world. Anaxagoras's account lacks the structure and coherence that Aristotle's theory of substantial form provides for his scientific account, yet it allows for some similar

claims.[38] While *Nous* might play such a role in Anaxagoras's theory, it must be acknowledged that, like other Presocratics, Anaxagoras has not provided principles of unified structure (a problem to which I turn in the next section).

Can we give a list of the Anaxagorean basic ingredients? We can say that every thing that is in the original mix is an ingredient (this is true but not very helpful), but we probably cannot enumerate all of them.[39] We can, nevertheless, make enough of a start to see that the list is both longer and shorter than some have thought. Shorter, because it will not include living organisms, for the reasons that I have already given in rejecting the expansive interpretation; longer, because while the opposites are surely on the list, both organic and inorganic stuffs (such as blood, bone, wood, rock, copper, fire, etc.) are on the list as well. Unfortunately, this tidy picture of ingredients and natural artefacts is disturbed when we add the complication of Anaxagoras's apparent inclusion of seeds in the original mixture.

2.3 Seeds

Seeds are mentioned only twice in the extant fragments: in B4a and in B4b. Here are the passages:

> Since these things are so, it is right to think that there are many different things present in everything that is being combined, and seeds of all things, having all sorts of forms, colours, and flavours. (B4a)

> Before there was separation off, because all things were together, there was not even any colour evident; for the mixture of all things prevented it, of the wet and the dry and of the hot and the cold and of the bright and the dark, and there was much earth present and seeds unlimited in number, in no way similar to one another. For no one of the others is similar to another. (B4b)

I begin by rejecting several accounts of the seeds. Seeds are not simply congeries of opposites, as they are said to be on some views.[40] They are

38 For an account of how Aristotle's biology, metaphysics, and physics fit together in a unified scheme, see Furth *Substance*.

39 *Nous* can enumerate them; and not only that, for *Nous* knows their natures and how they will behave at any given moment. See Essay 4.

40 This is Vlastos's position. Yet, on his view that *all* things are collections of *all* the opposites, there is no need to make special mention of seeds, as Anaxagoras does. Summaries of a range of views on seeds can be found in Teodorsson 45–64; he develops

not the smallest possible morsel of any Anaxagorean stuff (no smallest morsel is possible; moreover Anaxagorean stuffs are not particulate).[41] I assume that Anaxagoras's notion of a seed is the usual biological one that can be found in other ancient texts – the starting point of growth for an organism, either plant or animal (and also inorganic insofar as we can also speak of seeds of crystals).[42] This accords well with most of the doxographic evidence, and also begins to address a problem facing the moderate ontology account of basic things in Anaxagoras. Although Anaxagoras can explain the apparent coming-to-be of a thing's qualities by referring to mixture and so can explain the emergence of the living thing from the background mix, he has not given any account of structure: why is the thing that emerges from the background a dog or a daffodil rather than a cat or a camellia? Some of the difference between Kate the dog and Max the cat is a matter of stuffs and opposites (Kate is black and white, smooth, of a certain size; while Max is grey, fuzzy, of a smaller size). Yet the major difference is structural – Kate has a canine structure, Max a feline one, and the daffodil something altogether different. What is the source of structure in living things?[43] One obvious answer is: from the seeds from which they grew. Seeds are not only originating growth points, they also seemingly contain what we might call principles of structure. The question is what they might be in the Anaxagorean system in order to perform this function.

One suggestion is that Anaxagorean seeds are homunculi, and that there is a unique and formed seed for every living thing that has appeared or will appear in the history of the cosmos.[44] The emergence of an organism

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his own view on 85–86, 89–91. See also Lloyd *Polarity* 244 ff. and Schofield 123ff. I find myself most in sympathy with Schofield and Furley, although their views differ in important ways.

41 See Essay 3.

42 For a clear discussion of the issue, see Furley. Potts, too, take the seeds in Anaxagoras to be biological seeds, but claims that Anaxagoras means merely that 'the mixture is capable of yielding seeds of all ... species' rather than that seeds are 'suspended in the mixture' (91). Baldry discusses the prevalence, in early Greek thought, of an embryological model of the coming-to-be of the cosmos, and if one adopted a version of his view, one might take the 'seeds of all things' to be identical with the ingredients (i.e., to assume that the 'and' (*kai*) in both B4a and B4b is epexegetical rather than additive). Baldry himself does not discuss Anaxagoras; his evidence is from pre-Parmenidean mythical and philosophical texts, where the problem is the coming-to-be of the cosmos itself. Post-Parmenidean philosophers have a different set of problems, generated by Parmenides' logical analysis of coming-to-be and passing-away.

43 See Mourelatos 'Quality,' and Curd 'Metaphysics' on this problem.

44 One proponent of the view explains it this way: 'For want of a better term, ... "homunculus" ... designate[s] an already fully formed, but small, version of any substance,

from the seed is simply a matter of addition of ingredients to ingredients that are already in the seed (see B10) and that are already structured in a certain way. On this view, when Anaxagoras says that the seeds are all different from one another, he means that each is already not only an individual seed (which of course it is), but that it could in principle be tagged with a uniquely identifying name or definite description. Kate grew from a seed that could only become this dog, Kate, and not some other dog, and the same for Max the cat, and the same for me and for that daffodil plant there (the individuation of plants and fungi is a problem I leave aside here). What looks like coming-to-be is expansion. The seed expands as it grows, merely by having ingredients added in whatever form of nutrition is appropriate to it (e.g., water for trees, milk and then more solid food for mammals), containing the ingredients through the everything-in-everything principle.[45]

The homunculus interpretation is driven by the Eleatic denial of coming-to-be (taken strongly, as in the expansive metaphysical interpretation discussed earlier) combined with a (very) strict interpretation of B4b's claim that the seeds are entirely unlike one another. The rejection of coming-to-be requires that any organism that appears in the world at any time – Kate, Max, and I, for instance – must have already been there from the start; the claim that seeds are entirely unlike requires that each must have been always present as the full-fledged individual that it is during its period of active life. While the view may seem attractive, there are difficulties. First, the phenomenon of growth itself, which the homunculus view is supposed to explain, seems to be inconsistent with that view. The growth of an organism is not simple expansion (like the inflation of a balloon), but development. Consider a lima bean. It is a seed of a lima bean plant. But what is the seed supposed to be a very small version of? A bean or a bean plant? And if the lima plant, the plant at what stage? When it first sprouts, when it develops its mature leaves, when it blossoms, when the seed pods form? While *our* lima bean looks more or less like any other lima bean that will result from the plant, it certainly does not resemble a lima bean *plant* in shape, colour, structure, and so forth. And what is in the bean pods produced by the mature plant? Did the many bean seeds in those pods migrate from within the homunculus seed to the plant and then

not just of a human'; Lewis 1 and n. 1. A similar account of seeds is latent in Mourelatos's version, and in Furth's as well.

45 On whatever view of seeds we take, this must be the correct account of the mechanism of nourishment; see A45, where Simplicius says that if trees are nourished by water, there must be wood and bark and fruit in it (*in Phys.* 460.18–20).

to the pods? It is not clear how the sprouting and development of a seed of this sort can be reconciled with the evidence of either the fragments or the testimonia. The fragments say that apparent coming-to-be is to be explained by mixture and also compounding and compaction, particularly in the case of organisms, those things that have soul (B4a). Neither mixture nor compaction seems the appropriate term for the enlargement of a homunculus. Second, the testimonia suggest that the development of a particular organism can depend as much on where it is planted and the conditions under which it grows as on simple expansion. Aristotle says that for Anaxagoras the sex of the offspring is completely determined by the father; but in A111 Aëtius reports that for Anaxagoras, as for Parmenides, the parts of the generative organs from which the sperm originates and into which it is deposited make the difference.[46] Censorinus suggests that both parents contribute seed and that the offspring resembles the one contributing most (A111; there are hints here of B12's claim about predominance). It is difficult to reconcile this evidence with the notion that a seed is a homunculus. The homunculus view is too restrictive, leaving no role for the natural processes of mixture and separation to contribute to Kate's being the particular mix of dog that she is, or my being the particular short, grey-haired, female, human being that I am. A further difficulty with the homunculus view is that, if the seed is both one of the metaphysically basic entities in the theory and already from the beginning the particular individual that will develop, then that individual cannot be subject to passing-away and so must be immortal.[47]

The idea underlying the homunculus interpretation is one that we have already met in the earlier discussion of the basic things in Anaxagoras's

46 Aristotle seems to say that, for Anaxagoras, seed comes only from the father, while the mother provides the place. Anaxagoras's embryological theories are further discussed in Essay 5.

47 See Lewis 17. That the homunculus view entails that individuals are immortal is, for W. Mann, a *reductio* proof that the view is false. Mann also notes that it is surprising that, if Anaxagoras had maintained such a view, no ancient testimony remarks on it (see Mann 236). Lewis attempts to defuse the problem by suggesting that Anaxagoras's rejections of coming-to-be and passing-away spring from different motivations, the former, from Eleatic claims against the possibility of what-is-not; the latter perhaps from 'arguments which ban destruction on the grounds that otherwise one will run out of matter for new creations (as may have been the main concern of Anaximander).' If so, then, according to Lewis, the continuance of the ingredients that make up the individual 'solves the problem' (21 n. 36). This solution is unsuccessful: the evidence of B17 and the rejection of what-is-not in B3 suggest that the rejections of coming-to-be and passing-away are parallel, and that both are equally motivated by Eleatic concerns that would prevent the passing-away of anything that genuinely is.

system: unless seeds are homunculi, we cannot say that individual organisms are real. But this in itself cannot justify attributing the homunculus view to Anaxagoras. What *we* might think of as real, as the fundamental furniture of the world – this particular cherry tree, Kate the dog, ourselves – may not be fundamental for Anaxagoras. If I am right that physical objects in the ordinary sense are natural artefacts put together by the processes of mixture and compounding, and equally subject to the process of disintegration, then part of the motivation for the strong homunculus interpretation of seeds disappears. Anaxagoras does not need to have each and every individual organism already in the mix, because he can explain their apparent coming-to-be and passing-away. Insofar as they are dependent entities and not genuinely real, they fall under the mixture and separation principle of B17. But how, then, *should* we think of Anaxagoras's seeds?

Just as Anaxagoras's claim that all things were together, unlimited in *plēthos*, is a commitment to unlimited kinds of things, not numbers of individual particles of things, so too the unlimited seeds are seeds of kinds of things. An individual dog or plant seed, for instance, is the starting point, ingredients together with instructions (through *nous* or soul), for *a* dog or *a* plant.[48] That a seed of *a* dog becomes *this* dog may depend on earlier mixtures and separations in the whole cosmic system – that this seed ended up here and now in these conditions, with these parents.[49] That is why what we have here is Kate the border collie and not Spot the Australian shepherd. And a cat seed that is in that particular mix, that happens to get mixed along with all the other things into one of Kate's parents, just does not develop into a particular cat – at least not for now. It is in the wrong place at the wrong time, as it were. As the dog that 'contains' that cat seed dissociates ('dies') and the stuffs that composed it re-enter the background mix, that seed may get carried along in the cosmic process to the right place (another cat) and thus get a chance to grow later on and become Max, this cat here and now.[50]

48 In B22 'the egg whites are bird's milk.' The developing chick is nourished by this; perhaps Anaxagoras generalized from this to all seeds (see the notes on this fragment). There are intriguing reports in the doxography about plants: that they are earthbound animals (Plutarch, A116), that Anaxagoras says that they are animals and feel joy and sadness, and have intelligence and respiration (Pseudo-Aristotle *On Plants*, A117). These reports are consistent with the notion that *nous* or soul is an integral part of a living thing and is in the seed of that thing.

49 Anaxagoras's theories of sex differentiation and heredity are relevant here; they are discussed in more detail in Essay 5.

50 Theophrastus says that 'Anaxagoras maintains that the air contains seeds of all things and that these, carried down together with water become plants' (*Caus. Pl.* 1.5.2; A117). Hippolytus says (A42) that for Anaxagoras 'in the beginning animals came to be in

Suppose that a seed is a collection of basic stuffs along with a recipe for structure, perhaps provided by soul or *nous*.[51] In *De Anima* 2 (404a25ff., A99), Aristotle says that Anaxagoras claimed that soul is the moving cause; the discussions in *De Anima* make it clear that Anaxagoras had not distinguished soul and *nous* as carefully as Aristotle would like. Yet Anaxagoras does have a way to begin to distinguish them: *nous* in its role as the mover and organizer in individual living things *is* soul and is thus distinguished form its role as general cosmic mover. While the texts of B11 and B12 insist that *Nous* is not mixed with anything (as the ingredients are), it can be in things. It is in them as an organizing principle. Once the organism is growing as an organism, it is being added to and subtracted from in the orderly way that that happens, directed by soul. At that point, the seed, as the collection of stuffs that is Kate the dog, is still organized by *nous*, as Kate's soul. The stuffs of the seed are dispersed throughout the organism and are broken off out of it through the processes of nutrition and elimination. Yet, the principle of organization, the soul aspect, is still present as long as Kate exists as the dog that she is.[52] The stuffs of the seed are still present in some sense – as parts of the ingredients of the living (or once living) organism, just as the parts of a table are in the table while it is functioning as a table and also present once the table has been broken up. But we would no longer speak of it as a table when all that remains are the discrete pieces of wood and the screws that held them together; similarly, when I have dissociated and my ingredients

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moisture, and after that from each other' (*Ref*. 1.8.12). These claims are consistent with the view that I am suggesting here.

51 Note B4a's claim that human beings are compounded 'and also the other living things, as many as have soul' and the mention (in B12) that *nous* controls all things that have soul (and that this could include plants and animals). Aristotle comments at *de An*. 405a13 (A55): 'Anaxagoras seems to say that soul and mind (*nous*) are different ... but in fact he treats the two of them as a single thing, except that he above all makes *nous* the principle of all things. At any rate he says that, alone of the things that are, it is simple and unmixed and pure. He assigns both knowing and moving to the same principle, saying that *nous* moves the whole.' Teodorsson suggests that seeds are 'programs' and says, 'There existed [in the homogeneous fusion of matter] innumerable programmes, one for each individual sense thing to emerge. These, as well as *nous* and all substances, were there *ab aeternitate*. The cosmos stage has been prefigured, and thus has always existed as programmes or matrices, the *spermata*' (85). I do not adopt this view, but think that aspects of it might be helpful in thinking about seeds as biological beginning points. I further explore the seeds and *nous* in 'Everything.'

52 Aëtius says that for Anaxagoras soul is indestructible (4.7.1, A93). Of course, all genuinely real ingredients are indestructible for Anaxagoras. This makes seeds look rather like forms; on this see Furley 'Naming.'

are dispersed, we would hardly speak of the stuff that constituted me *as* me.

Are seeds discrete components in the original mixture? What Anaxagoras says in B4b has suggested to commentators that they are, for B4b seems clearly to refer to the original state. B4a is less clear, but it implies that at any moment in the mixture (no matter where we are in the process of separations) there are seeds present. In B4a and B4b Anaxagoras uses *eneinai* [to be in or present in]; in B11 he says that *Nous* is present in some things [*estin . . . kai nous eni*]. That the presence of these seeds means that the mixture is not homogeneous should not be disturbing, as Anaxagoras is not committed to homogeneity (the principle of homoiomereity) in the strong sense. Like everything else (except air and aether), seeds are not manifest in the original mix because of smallness. Anaxagoras can say that earth, the hot, and so on are in the mixture because they will emerge from it, but they are neither discrete nor manifest in the original mix. Seeds can be present in the same way, as *nous* or soul in the original mixture, without thereby being discrete individuals.[53] As the rotation progresses, stuffs are added, and organized by the seeds. In our present state, some seeds are manifest, that is, large enough to appear against the background, and some are not, because they are even now too small to be perceived.[54] Bean seeds are large, chicken eggs are large, dog seeds are small. This account is highly speculative, but it seems to accord with the way things appear to us, and part of what motivates Anaxagoras' theory is the need for rational cosmology, for a metaphysically based account of the world as it appears. The phenomena are a glimpse of the unseen (B21a), and although the senses are feeble (B21), they are our starting point for the use of the *Nous* that is in us.

53 W. Mann suggests that '*spermata* can easily mean kinds of seminal stuff' (248 n. 17). We might recall that there are similar difficulties about counting instances of *Nous*, and saying how *Nous* is in things.

54 This is true no matter how we interpret large and small in Anaxagoras.

3

Everything in Everything

There is a share of everything in everything ... (B12)

The original state of things was a motionless intermixture (*summixis*; B4b) of all the ingredients, those stuffs and opposites that are separated off and recombined to form the natural world as it develops (and as we perceive it). B1 claims that all things were together and nothing was manifest because of the smallness of the ingredients; further, B1 says that 'air and aether covered everything;' they are 'the greatest among all things, both in amount and in largeness.' The smallness of the things in the original mix is one reason why nothing else is evident; the density of the air and aether (which together were very large) is another. It is as though a bright fog covered everything, but there is nothing to perceive in any case because everything in the mix is so small.[1] When *Nous* instigates the rotation of the original mixture, the ingredients begin to separate off, but the separation can never be completed; B6 makes clear that all the ingredients remain

1 It might seem that these two claims are inconsistent. If nothing is manifest because of the mixture, how can air and aether predominate, insofar as predominance would seem to be a function of manifestness (see the end of B12)? Anaxagoras seems to mean two things here. First, air and aether are by far the largest ingredients in quantity, so their sheer bulk guarantees that they will pervade all things. (For instance, a mixture of one kilogram of fine flour mixed smoothly with 1 gram of coarse sea salt will appear as flour even though the salt is evenly mixed.) Second, this dominating mixture of air and aether seems to produce a general overriding fogginess (see Schofield's remarks, 155–56 n. 6). The comparative amounts of air and aether in the mix are so overwhelming that they are more manifest than anything else and so appear to cover all things. But this should not be taken to mean that either of them (or anything else) appears in a 'pure' state in the original mixture (or at any other time).

mixed no matter how long the rotation continues. So, there never were, are, or will be pure instances of any of the ingredients of the initial mix.[2] This is a radical claim. Anaxagoras not only denies that all basic things can become completely segregated from one another (as, for instance, occurs under the rule of Strife in Empedocles' system), but he also holds the much stronger position that nothing that is basic (either stuff or opposite), in no matter how great a concentration or small an amount, can ever exist in a pure state, no matter how briefly. B6 says: 'just as in the beginning, now too all things are together' and B11 adds that 'in everything there is a share of everything except *Nous*, but there are some things in which *Nous*, too, is present.'[3] So, not only are all things mixtures, every mixture is a mixture of everything. Why should Anaxagoras suppose that everything is in everything?

Much of the doxographic tradition attributes Anaxagoras's adoption of the everything-in-everything principle to a desire to explain nutrition and growth, and this view has been accepted by many modern commentators.[4] On this account, Anaxagoras is puzzled by why a vine takes in water and grows larger, producing more leaves and grapes, while a child ingests milk, barley, and water and grows larger, producing more bone, blood, and flesh. Accordingly, Anaxagoras says that flesh and bone, leaf material and grape material must be in the ingested food and are added to what is already present in the child or the vine. Now, while nutrition and growth indeed provide spectacular evidence of a certain sort of change that needs to be explained, these processes are instances of a more general metaphysical question about change and becoming. Indeed, the testimonia that attribute to Anaxagoras a special interest in nutrition and growth almost always link

2 The impossibility here is metaphysical, not physical (it is not simply that there is not enough time for a complete separation to take place); no matter how long the rotation goes on or how strong its force, unmixed instances of a basic thing will not occur. This is a function of the fact that 'all things are together' in the original mixture (B1) in conjunction with the fact that there is no smallest, but only a smaller (B3).

3 This is usually called the Principle of Universal Mixture (see Kerferd, and Graham 'Postulates'). On *Nous* and why it is excluded from the 'everything-in-everything' principle, see Essays 4 and 5.

4 Plato's comments in *Phaedo* 96c–d, generally assumed to be a reference to Anaxagoras (A46), suggest this; Aristotle connects Anaxagoras and nutrition in a brief comment at *GA* 723a9–11. Among the later doxographers, see Simplicius in A45, Aëtius in A46, and the scholiast to Gregory of Nazianzus in the context of B10. Among modern commentators, see Jaeger, Cornford (in 'Matter,' who recognizes that birth, nutrition, and growth are special cases of the metaphysical problem of becoming, but stresses their primacy in Anaxagoras's theory), Vlastos ('Physical'), Guthrie, Lloyd, and Sinnige (who stresses the 'biological pattern' 126). Lewis connects the nutrition problem and the Eleatic denial of the reality of coming-to-be (14).

that interest to a more basic inquiry into the rational status of becoming. This is clear from Plato's comments in the *Phaedo* (A46), where Socrates clearly links problems of growth with more general worries about becoming and causal explanations. The connection also appears in the scholium on Gregory of Nazianzus that forms the context to B10. The metaphysical problems of what-is are at the heart of Anaxagoras's theory, with its emphasis on no coming-to-be or passing-away (B17), its insistence that everything is in everything (B1, B6, B8, B11, B12), and its peculiar claim that there is no limit to largeness or to smallness (B3 and B6).[5]

As we have seen (Essays 1 and 2), the metaphysical question is grounded in the Parmenidean argument demonstrating that a rational cosmology must deny the reality of coming-to-be and passing-away and begin with entities that are genuinely real. Once he accepts these Eleatic requirements, Anaxagoras's problem is to reconcile them with an explanation of the sensible world – a world in which the processes of nutrition and growth are evident (as are other kinds of change, such as meteorological, seismic, and oceanic changes). He does this with two claims. First, in B17 he agrees that coming-to-be and passing-away are not real, but are appearances that result from the separation and mixture of genuinely real things, the ingredients of the original mixture of B1. Then, to guarantee that the mixtures and separations can proceed properly (without violating the ban on coming-to-be and passing-away) he stipulates that the ingredients are such that all of them are always everywhere (the everything-in-everything principle).[6] The link between the two claims is the principle of indefinite smallness: Anaxagoras denies (in B3) that there can be a least (that is, there is no lower limit to smallness), and then (in B6) he shows that the denial of a least entails that nothing can be completely separated or exist apart. This ensures that everything is in everything. On this account, the 'everything' on the left-hand side of the claim ranges over all the basic things or ingredients: the stuffs and the opposites that are genuinely real. The 'everything' on the right-hand side will range over those same stuffs and opposites, as

5 See especially Barnes (*Presocratic*, chap. 16) and Schofield (*Essay*) for the primacy of the metaphysical question in Anaxagoras's theories. Furth ('Hero' 106 n. 13) provides a good discussion of the relation between the metaphysical and nutritional questions.

6 It might be asked whether Anaxagoras needs a principle as strong as this to do the job. Do we need to have everything in everything in order to explain the facts of nutrition and growth? Must there be flesh in copper or wood in flesh? (See for instance Cornford 'Matter' 283–85; also Lewis 8–9 with n. 17.) Perhaps nutrition can be explained with a weaker principle, but if we begin with the metaphysical principle, as Anaxagoras does, we cannot rule out anything from the mix a priori. Guthrie comments on the relative economy of the everything-in-everything thesis compared to the 'some things in some other things' assumption (2:287 n. 2).

well as all the temporary emergences, both the natural artefacts (such as plants and animals) that are the results of the mixtures and separations, and those human-made artefacts that are the result of human activity. All the ingredients are at all times everywhere and in everything, but what the ingredients make up are not themselves in everything. Air, the hot, flesh, and gold are all ingredients and all are in each other and in Kate the dog (a natural artefact); all will be in the materials that separate off when Kate ceases to be (i.e., the mixture that is Kate is dissociated or dissolved), but Kate (or dog) is not an ingredient in everything else.[7]

The difficulty is to find an interpretation of this notion of 'everything-in-everything' that makes sense, is consistent with Anaxagoras's claims, and will do the work he wants the principle to do. Here is one model. Consider the state of the things as described in B1, before the rotation begins. All things are together, unlimited in *plēthos* (amount or extent) and in smallness. Because of smallness, B1 continues, nothing was evident or manifest. In other words, in the complete mix of all the basic things, no ingredient was sufficiently concentrated or predominant to be evident to a potential observer. B6 tells us more about this mix: it takes the 'all things together' claim to be stronger than a mere mixture of all things in the sense that the pieces of everything are juxtaposed (as in a mosaic) and too small to be perceived. Rather, B6 expands the claim from 'all things together' to 'everything *in* everything' ('all things have a share of everything') and explicitly concludes that this was the state of things in the original mix: 'just as in the beginning so too now all things are together.' So, in the original state, all things are in all things. We can picture this by first imagining the ingredients as being like pastes or liquids; they are all mixed or smeared together such that all the ingredients are in every possible place in some concentration or other. Even though everything is unlimitedly small, and the mixture a thorough one, the mix need not be uniform; the concentrations of the various ingredients can vary in density or intensity in different places, but all of them have some non-zero density at every place.[8] Once the rotation of the mass begins, changes in relative

7 Seeds are a separate case; all ingredients are in every seed, but each seed is different. Seeds are thoroughly scattered through the background mixture, but every seed is not at every place as the ingredients are. For more on seeds, see Essay 2.

8 Sorabji (62–63) argues against the blending model on the grounds that it cannot provide a 'motive for Anaxagoras' insistence (fragment 1) that in the beginning all things were infinitely small.' According to Sorabji, the blending model cannot show why 'minimum size give[s] us stuffs in isolation.' Lewis both expands Sorabji's objection and responds to it. Both Sorabji and Lewis accept a particulate structure for Anaxagoras's basic things; below, I suggest (as others have) that the basic things are not particulate. We do not

density will begin to occur, as the ingredients begin to shift and separate off (like being attracted to like, perhaps), but at no time will there be pure or unmixed areas of any ingredient. Indeed, no matter how much a particular ingredient (flesh, fire, gold) may emerge from the background mix in a certain area and become manifest (such that we might say, 'Here is some gold'), all the other ingredients will still be mixed in that ingredient in that area to some degree. We should be careful not to be misled by the talk of 'separation off' in Anaxagoras. There is always a mixture of all things everywhere; in this world air and sea, and other apparently discrete things (like dogs and trees), are simply temporary mixtures or (re-mixtures) that seem to stand out against the background mixture. Because Anaxagoras's world is a plenum, what occurs is a shifting of ingredients, and any relative separation also involves mixture. What looks like separation from the mix will actually be more like a clumping together in the mix. Thus, even the dissociation of a natural artefact like a human being (what we would call its death) is the re-absorption of its ingredients into the background mixture.

To ensure that everything will be in everything, Anaxagoras must suppose that all the ingredients must be everywhere at all times. So, all ingredients are in every place. B6 argues that because there is no least (or smallest), nothing can be separated completely from everything else such that it can occur 'just by itself.' Although the reasoning of B6 may seem obscure, Anaxagoras must be assuming that complete separation of an ingredient is possible only if there is a smallest (of that ingredient) in a mix. Suppose we have a mixture of only two ingredients, x and y. Then, let complete separation occur (i.e., we have removed all of the x from a mixture of x and y so that we have just pure y by itself). If this happens, then there must have been a previous stage at which there was some least amount or lowest concentration of x (call it a 'bit of x') in the mixture, which was then removed, leaving only y. Thus, if complete separation is possible, then there must be least bits; but B3 argues that there are no least bits or lowest concentrations, so no complete separation can occur. So, if, as Anaxagoras asserts, the beginning state was a complete mixture of all

need to find the motive for indefinite smallness in the blending model itself; as we have seen, that comes from Anaxagoras's metaphysical commitments. It is indefinite smallness that guarantees that there is no what-is-not. Moreover, as presented here, the model helps to explain the picture of the world that Anaxagoras gives us in B6. It is, I think, a mistake to try to interpret Anaxagoras by beginning with the sensible world and working backwards. Rather, we should begin with his metaphysical commitments and his picture of the original state of things, trying to understand that state and how things developed from that state to the present one.

the ingredients, then we continue to have a mixture of all things in all; as B6 concludes, 'just as in the beginning so too now all things are together.'

The argument turns on the denial of a smallest or least, so an obvious question arises: what does it mean to claim that there is no smallest (or largest)? Just now I spoke of least bits of ingredients, as though the ingredients were particulate in structure and Anaxagoras were denying that there can be a smallest particle of any ingredient. No matter how much we divide up a particle of an ingredient, it can be divided into still smaller particles, which can themselves be divided and so on.[9] While it is true that, if there were particles of basic stuffs, Anaxagoras would insist that they be divisible without limit, I do not think that a particulate model is the correct interpretation.[10] If Anaxagorean stuffs are not particulate, then 'small' and

9 The view that Anaxagorean ingredients are particulate and indefinitely divisible into limitlessly small particles can be found in Lucretius (A44), and, among modern commentators, in Guthrie (2:289; see also 298 n. 2), in Kerferd, and in Sorabji. The claim that the principle of no smallest implies infinite divisibility can be found in many commentators; see, for instance, Strang (361: 'every piece of matter is infinitely divisible'), W. Mann, and Sorabji. Konstan refers to the 'limitlessly small bits' in the original mix (for instance, on 147). In *Fragments*, Sider adopts Zeller's emendation in B3 and so reads it as primarily concerned with denying that what-is can be cut away or divided into nothing. He also argues that Anaxagoras developed sophisticated theoretical accounts of the mathematical notion of infinity (86–89). Sinnige, who sees Anaxagoras responding to Zeno, has a similar view (127–37).

10 Schofield, who rejects the particulate account in his *Essay*, canvasses some of the difficulties with it on pp. 73–75. Chief among these is that there is no explicit statement in Anaxagoras that his stuffs occur as particles. (Some commentators take the seeds of B4a and B4b to be the necessary particles, but this is, I think, neither obvious, nor forced on us by the fragments; see Essay 2 for the account of seeds adopted here.) In addition, Schofield, relying on Strang's analysis of a regress problem generated by trying to determine the character of any particular bit of an ingredient, points out that the particulate version makes great difficulties for interpreting 'everything in everything' in a coherent way, for each particle must have unlimited particles of everything in it, and the same for each of the particles in each of the particles and so on (74–75). Moreover, as Schofield notes, division is not what gets the most attention in the Anaxagorean fragments; rather mixture, separation, smallness and largeness are stressed (79; contrast with Sinnige 132–33). Further difficulties with the particulate account are raised by Barnes (*Presocratic* 323–26) and Inwood (19–22). Inwood notes that the particulate account may have come to be attributed to Anaxagoras because of Aristotle's habit of grouping Anaxagoras and Democritus in his discussions of his predecessors. This grouping was perpetuated by later commentators, including Aëtius (perhaps following Theophrastus), the Epicureans, and Simplicius, and so Anaxagoras came to be identified with a non-atomistic particle theory in contrast with Democritus, whose theory is grounded in atomistic particles. The assertion that Anaxagorean ingredients are not particulate is not undermined by the claim that some things occur in the phenomenal world as particles or nuggets, for instance, large or small nuggets of phenomenal gold (as found in streams in the Yukon

'large,' at least here in B3 and B6 (and in B1 and B2 as well), do not refer to the size of a piece or drop or bit of an ingredient. Rather, we should think of the basic things as like liquids or pastes that flow together and occupy the same volume of space, thus producing a thorough (though not uniform) mixture. The mixture is not uniform because there are different densities or concentrations of the various ingredients in different areas. In the original state, the mixture and the densities are such that 'nothing was evident on account of smallness' (B1). I take 'small' and 'large' in this context as a way for Anaxagoras to speak of submergence in and emergence from the background mixture of all things.[11] Thus, although there is gold in my flesh, it is very small, i.e., its density is so low that it is submerged in the rest of the ingredients, and so it is not manifest. In contrast, the flesh is large, that is, emergent from the background mix, along with certain colours, textures, and amounts of hot and cold.[12] So, in B3, when Anaxagoras argues that there is never a least, but only a lesser, he is asserting that there is no lower limit on the concentration or density of an ingredient at any point in the mixture, so there is no limit on how submerged in the mix an ingredient can be. It becomes easier to understand the principle of indefinite smallness if we recall that it is linked with the Eleatic denial of what-is-not and that it plays a crucial role for Anaxagoras in explaining change. No ingredient, such as gold, can sink to such a low density that, sinking further, it finally disappears. Think of rolling a sheet of gold leaf to ever finer thinness such that a hole finally appears in the sheet because, at that point, the sheet has become thinner than an atom of gold. Anaxagoras denies that the analogue of this can ever take place

gold rush), for these are mixtures of all things in which gold predominates (see B12), not nuggets of pure gold. Nor are these nuggets put together from very small particles of pure gold combined with varying numbers of very small particles of the other stuffs and the opposites; Anaxagoras is insistent that 'everything-in-everything' applies at all levels.

11 This interpretation of 'small' and 'large' is close to that of Inwood, who defines the terms this way: smallness, 'the characteristic of being mixed and so not distinguishable from other stuffs'; largeness, 'the characteristic of being separated out and so distinguishable from other stuffs' (Inwood 22). Furth defines in terms of latency (smallness) and manifestness (largeness) but thinks that these are to be distinguished from being mixed and separated, partially because he thinks that 'everything' in Anaxagoras covers not only ingredients but plants, animals, and other things that I have called natural artefacts (see 'Hero' 110–12, 113–14 n. 27).

12 Large and small will be relative here (see B5). Any given density of an ingredient will be large (emergent) in some contexts, and small (submerged) in others, depending on the densities of the other ingredients. (Compare this to Socrates' comments on Simmias's largeness and smallness at *Phaedo* 102bff.)

in the ultimate mix of things that forms the background condition for the phenomenal world. Could such a disappearance occur, it would have been because the ingredient has ceased to be at that point; yet 'what is cannot not be,' and so such holes or absences of ingredients cannot occur in the mix.[13] Rather, the density of gold is so low that it is submerged in the mix. The gold is not manifest to a perceiver, but there has not ceased to be gold at that place. The proviso that there is no lower limit (no least, but always a lesser) guarantees that no ingredient can be completely removed from any place, so the mix of everything in everything is maintained. Thus, no matter how low a density is reached, a lower density is still possible; no ingredient can reach a zero density (i.e., absence) at any place. This blocks progressive removal of ingredients, leaving a single pure ingredient in any area (as discussed above), and guarantees that no Anaxagorean stuff (or opposite) will ever occur on its own ('just by itself').

Just as there is no limit on its smallness, so, too, there is no limit on the largeness of an ingredient. However manifest an ingredient (such as air or aether) is, it can become still more manifest by separation, apparently standing out further from the background mix, although it too will always be a mixture. The larger (more manifest) ingredient may become yet larger and the densities of the other ingredients mixed in it may become comparatively smaller, but because there is no smallest, these smaller (less manifest) ingredients will never be so completely swamped that they cease to occur in that region of the cosmos. So, although in fragments B1 and B2 air and aether are very large – B1 claims that they are 'the greatest among all things both in amount (*plēthos*) and in largeness' – they do not occur in pure, unmixed states, for even in the furthermost regions of the cosmos, they are mixtures of all things. At the end of B3 Anaxagoras claims that 'it [the large] is equal to the small in extent (*plēthos*), but in relation to itself each thing is both large and small.' As we have seen, just as there is no limit on smallness, so there is no limit on largeness; just as any ingredient may become more submerged, it may also become more emergent.[14]

13 One might object that in the case of gold or phyllo, the stuff has not disappeared; it has simply been pushed to another spot, leaving a particular area with no gold or phyllo, while another area has more than it used to have. For this to happen, Anaxagoras would respond, there would have to be a least amount of the gold that was then extracted from the place where the hole appeared and moved to another place. His own analysis would be that the gold had reached a concentration so low that it was no longer manifest, but was still present, submerged in the background mixture.

14 Thus, air and aether can continue to dominate in the mix even as the rotations that produce the world as we perceive it continue to expand over a wider and wider area

On any interpretation, the final statement of B3 is enigmatic.[15] In introducing the quotation, Simplicius says that Anaxagoras is talking about the *archai*, that is, the ingredients that are the basic things in his theory. So, Anaxagoras is not claiming that any mixed or compacted thing (one of the artefacts put together from the ingredients) is both large and small (larger than some things and smaller than another). Rather, if we read 'small' and 'large' in the way suggested here, in B3 he is asserting that any ingredient can be both emergent and submerged in the total mix; that is, that given that everything is everywhere, an ingredient will be larger in some places and smaller in others.[16]

A question about this analysis of large and small may be raised. Does the emergent/submerged analysis of large/small collapse into an account of the size or amount of the ingredient? Consider this problem (from Inwood): If there is hot in ice, 'then there will be very little of it indeed: it must

(as B12 states). B13 shows that the breaking up caused by the rotation can continue indefinitely; this will produce both larger and smaller things (in the sense of emergent and submerged).

15 Strang, who opts for infinite divisibility, explains it this way: ' "Each thing" here means "each countable, i.e. isolable, bit of the whole." What Anaxagoras is saying is this: given that the whole is infinite both in extension and divisibility, then if you select two bits in such a way that one of them is as many times larger than the other as you please, still you cannot call the larger one large or the smaller one small; for there will always be bits as many times larger than the larger one as you please, and also bits as many times smaller than the smaller one as you please' (365).

16 Given that B3 says that each *is* both large and small, Anaxagoras is probably describing the state of things after the rotation and hence separation have begun, and perhaps even the state of things now, when much separation and emergence have already occurred. In the original state everything is apparently indefinitely small and 'nothing was evident because of smallness.' At the conclusion of the fragment, Simplicius gives the following explanation: 'For if everything is in everything and if everything is separated off from everything, then from what seems to be the smallest something yet smaller than that will be separated off, and what seems to be the largest was separated off from something larger than itself.' Simplicius might seem to take the claim as one that involves physical size rather than degree of emergence and submergence. There are reasons to resist this interpretation. First, Anaxagoras's claim about largeness and smallness is general, and should cover all the basic ingredients, including both stuffs and opposites. While it makes sense to say that there is little hot or little bitter in a mix, it is more difficult to see how we can speak of the *physical* size of the hot or the bitter in a mixture. Second, whatever is larger has indeed separated off or out of the background mix. But there is no reason that there must be a larger emergent mass of the particular ingredient in question from which the first large thing has separated. For Anaxagoras, the emergence of an area of an ingredient is not always a matter of being broken off from a larger area, as a small lump of coal is broken off from a larger one. An ingredient can become larger by increase of density through re-mixture of what has just separated off (see B17).

be very well mixed. To allow for all possible cases we must set no limit to the thoroughness of the mixture.'[17] It is true that the hot must be very well submerged in the ice; but submergence may not be a function of its being well mixed, or there being very little of it present. Something can be well mixed without thereby being submerged or unapparent in a mixture – consider raisins and nuts that are well mixed into a cake batter. Their being well mixed means that they are evenly distributed through the batter, but they are by no means thereby hidden or submerged in the sense relevant here. Moreover, with respect to the ingredients in the batter, there may be very few raisins and nuts in the mix; but again this may not make them less apparent. What is relevant is *relative* density or concentration in a given local area of the mixture. The hot will be very small (i.e., submerged in the mix) because its density or concentration in the particular local area that constitutes the place of the ice is low with respect to other ingredients (water, the cold). But there is no lowest limit to the hot; there will never cease to be hot in all places at all times.

We should be clear about the claim here. I am not suggesting that by 'large' and 'small' Anaxagoras *means* 'emergent' or 'submerged' (i.e., that he is proposing to redefine the word so that any occurrence of the *words* 'large' or 'small' must be replaced by the *words* 'emergent' or 'submerged' respectively). Rather, in certain cases we should understand that what it is for something to be small just is for it to be of such a density or concentration that it is submerged in the mix and so is not apparent or evident. Context must determine the appropriate sense.[18] Thus, in B1, Anaxagoras says that in the original state all things were together, 'unlimited in amount and in smallness, for the small, too, was unlimited. And because all things were together, nothing was evident on account of smallness.' In all three instances of the word here, 'small' apparently has its specialized sense of 'submerged.' Yet, at the end of the fragment Anaxagoras says of air and aether, 'these are the greatest [largest] among all things both in amount and in largeness,' where the first claim refers to measure, and the second claim is a special use of 'large,' showing that air and aether are the most emergent, dominant, or evident things in the mix. Similarly, in B12, there are uses of 'small' that surely are the standard sense of size (of the revolution he says, 'first it began to revolve in a small area'), and others, coupled with 'large,' that suggest the specialized sense, but *may* be the standard sense (*Nous* controls everything that has soul 'both the larger and the smaller'; '*Nous* is all alike, both the larger and the

17 Inwood 29.

18 The case is similar in Anaxagoras's use of *chrēma*. See the notes on B1.

smaller').[19] Indeed, there can be cases in which both senses can be at work. A dog grows (becomes larger in size – the standard sense) when (among other ingredients) flesh is added to flesh; that is, when flesh becomes larger (more dominant or emergent – the specialized sense) in the temporary mixture of basic ingredients that is the dog.

Using the density model, we can also understand the principle of predominance as it occurs at the end of B12: 'Nothing is like anything else, but each one is and was most manifestly those things of which there are the most in it.' Here Anaxagoras says that a phenomenal object, a temporary emergence from the background mixture, will appear to have those characteristics or properties of which there are most in it. Everything has a share of everything, but those things occurring in proportionately greater concentrations or densities in a particular area (and so most emergent there) will give to the mixed object its own peculiar characteristics.[20] It might be that no particular area of the whole mixture is just like any other; different ingredients can have indefinitely many varying densities all through the mix, and even phenomenal objects that seem quite remarkably similar will vary in some degree or other because of the varying concentrations of the ingredients in it. In all cases, phenomenal blood or copper will have as its predominant ingredient blood or copper, respectively, but the density may vary within a range before the thing before us ceases to appear to be blood or copper because some other ingredient or set of ingredients comes to predominance through the shifting and rearranging of the basic things.

There is a question of whether more than one basic ingredient can, in fact, predominate. Phenomenal objects, with their complex colours and savours can have a number of predominant ingredients.[21] This may seem

19 It might be thought that *Nous* can be neither large nor small in the specialized sense, since it is not mixed with things (B12). But B11 says that *Nous* is *in* some things, and if the things that *Nous* is in are small in the special sense, so then will *Nous* be small in that sense. For more on *Nous*, see Essay 4.

20 On other models, there must be larger *amounts* or larger particles in a local area in order for an ingredient to predominate or make its presence felt. But consider adding five drops of almond extract to a cup of milk. The almond essence is not 'larger' than the milk, but it can predominate in the taste because of the strength of the density of the extract.

21 Graham considers this, and seems to claim that only one ingredient can be predominant: 'If there are five measures of water in a mixture, two measures of salt, and one measure of sugar, the whole will appear to be water. It will of course be salty, sweet water; but it will be water, not salt or sugar' ('Postulates' 92). The talk of measures here can be misleading; the relevant question is not necessarily 'how much?' (or 'how many measures?'), but 'what strength?' of concentration or density. Moreover, whether the water is bitter or sweet will depend not only on the strength of concentration

strange, given that 'predominance' suggests that a single ingredient dominates. This may be true in the cases of minerals and metals, where the phenomenal occurrences will have some 'impurities' (other ingredients) in their mix, but one thing (copper, garnet) predominates.[22] But in animals (and other mixtures), in addition to flesh, blood, and bone, there will also be various colours and opposites manifest (and so predominating).[23] This is what Anaxagoras means in saying that 'each one is ... those things of which there are most in it.' Nevertheless, not every quality that predominates over an opposite in a mix will be manifest in every case. For instance, although sweet and bitter are in everything, some mixtures taste neither sweet nor bitter. In these cases, even though there might be a greater density of sweet, the densities of both are below the threshold of taste in a given case. Moreover, how a complex thing (a mixture) manifests itself is partially dependent on the observer: what seems to me a bland biscuit may be full of savours and flavours to Kate the dog (whose nose is much more sensitive than mine). Some people have a greater capacity than others to discern chocolate or mint in a subtle sauce. This is not just a matter of opposites predominating, but of whole ingredients that can be detected or missed.

We have seen that it is a consequence of the claim that all things are in all things that pure unmixed instances of the stuffs and opposites can never occur, and this is part of Anaxagoras's motivation in adopting the everything-in-everything principle. Nevertheless, there must be some way for us to identify ingredients, if only to be able to recognize their phenomenal occurrences and detect their presence and causal powers in other things. Applying the principle of predominance enunciated in B12 to ingredients, bone would be that which is mostly bone. But bone has everything in it, so the mostly bone in this bone is a mix that is mostly bone. And that mostly bone is itself a mix that is mostly bone, and so on, *ad infinitum*. It has seemed to some commentators that Anaxagoras's principle

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of the sweet (for there is sweet in everything, if it is a basic ingredient), but also on the strength of the bitter that would neutralize or overcome the sweet. This area of water is sweet because the local area of the mix is one in which both water and sweet predominate in the relevant ways; that area of water is salty because of the predominance of salt over other savours and flavours; this third area of the mix is one where the damp is quite submerged, the dry and salt quite predominant, and so we call it salt.

22 It depends on how we determine the natures of such things. Does a particular colour or hardness figure as part of the nature of garnet or copper? This is a question that scientific and philosophical investigations and analyses will have to answer. It seems clear that specific colour or height are not part of what it is to be a human being.

23 Anaxagorean individuals (this tree, this dog) would seem to be bundles of characteristics; it is not the case that what predominates in a dog is dog (for dog is not an ingredient).

of predominance makes it impossible ever to identify anything at all.[24] Many solutions have been proposed, including claiming that only the opposites are basic (i.e., adopting the austere ontology), and then building up other things from them; or denying that any fundamental analysis of the ingredients in the original mixture is needed in Anaxagoras's theory.[25] These proposals have difficulties. We have already seen (in Essay 2) that there are reasons against adopting the austere ontology. As we shall see in Essay 4, B12 makes clear that *Nous* knows and must know the natures of the basic things; in Essay 5 we shall see that fundamental analyses of the basic things will be relevant (and perhaps crucial) to Anaxagoras's scientific theories about the nature of the stars and sun, for instance.

A more successful solution to the problem (developed by Strang) marks a theoretical distinction between elemental and phenomenal (or common) instances of the basic things.[26] This means that we distinguish in analysis between the nature of a basic thing (what it is to be hot or gold, for instance) and the actual occurrences of heat and gold in the world as we perceive it. The notion of a *theoretically* pure ingredient allows for an analysis that can distinguish between different mixtures, and this will be important for Anaxagoras's scientific theories, as well as for his account of the characteristics of phenomenal things. It also can account for what *Nous* knows as it sets in motion the revolution that produces the separations and mixtures responsible for the features of the world around us. It is crucial to remember that Strang's distinction is entirely conceptual; although in principle we can talk about pure ingredients for the purposes of theoretical

24 See discussions in Cornford, Vlastos ('Physical'), Strang, Barnes (*Presocratic*), and Matthews.

25 For the first solution, the turn to what I call an austere ontology, see Essay 2. For the second see, for instance, Kerferd and W. Mann who attempt to sidestep the difficulty, denying that Anaxagoras was interested in giving analyses of the ingredients. Kerferd: '[Anaxagoras] had no reason to attempt a definition or a description of gold in this way. He is concerned with change and not with description or definition. Provided perceived gold can be recognized it can be treated as primary, not derivative, not as something to be built up from smaller particles, but as a starting point for analysis' (501–502). Kerferd claims that there may be a logical problem that may have some force, but denies that it ever requires 'the emergence of simple substances' (502). Mann makes a similar point (241–42).

26 Strang calls them E- and C-substances (Strang 361–63). E-substances are pure and unmixed, while C-substances are mixtures of all the E-substances; the character of a particular C-substance is determined by the predominating E-ingredients in it (362). For disagreements with Strang, see Barnes (*Presocratic* 326–29), Stokes ('Part I,' 2), Kerferd (500ff.), Sinnige (137), and Konstan (145–46). Strang's E-substance is what I call an ingredient or basic thing; his C-substance is a phenomenal mixture in which a particular ingredient predominates. For an analysis of what Anaxagoras might mean from a contemporary perspective, see the articles by Matthews and Sisko.

analysis, in actuality, according to Anaxagoras, the world contains no such pure ingredients.[27] All things were, are, and will be together. As Anaxagoras claims in B6: 'Since it is not possible that there is a least, it would not be possible that [anything] be separated, nor come to be by itself, but just as in the beginning, now too all things are together. In all things there are many things present, equal in number, both in the greater and in the lesser of the things being separated off.'

It has been argued that there is no evidence in the fragments for even a distinction in principle between pure and phenomenal instances of ingredients.[28] While there is no direct evidence (i.e., there is no fragment that explicitly makes the distinction), there is indirect evidence. In B12 Anaxagoras says that *Nous* knows all the things in the original mix (and all the things that are emerging, have emerged, and will emerge from that mix) and that, having this knowledge, it can control and order all things (B12). Without knowing the natures of the things in the mix, and how they behave, *Nous* would be unable to exercise genuine powers of control, for the characteristic behaviour of an ingredient follows from what it is in itself, that is, its nature (what later philosophers might call its essence). This nature constitutes what a thing would be were it to exist in an entirely pure state. So, if *Nous* genuinely has the powers of discernment and control that Anaxagoras attributes to it in B12, there must be natures or theoretically pure instances of an ingredient. I argue in Essay 4 that *Nous* indeed has these powers. There is also evidence at the end of B12 that Anaxagoras distinguishes between pure and phenomenal instances of an ingredient. There, he claims that 'each one is and was most manifestly those things of which there are the most in it.' As we have seen, this means that any phenomenal entity gets its phenomenal qualities from the predominating ingredients.[29] The character of each ingredient, in turn, must be grounded in the nature of that ingredient (the theoretically pure instance of it). Here, we again have indirect evidence for the distinction between pure and phenomenal instances of ingredients. I conclude that it is reasonable to attribute the distinction to Anaxagoras. This gives him a way both to maintain that everything is in everything (a claim that he adopts to make his system consistent with Eleatic requirements) and to permit a coherent analysis of the contents of the sensible world.

27 Strang 362. Although Strang stresses this aspect of his distinction between E- and C-substances, it is sometimes overlooked in discussions of his analysis.

28 See, for instance, Barnes against Strang (*Presocratic* 329 with n. 23); also Louguet.

29 This also indicates the importance of both sense perception and understanding for us in making sense of the phenomenal world.

4

Minding Things: The Workings of *Nous*

The other things have a share of everything, but *Nous* is unlimited and self-ruling and has been mixed with no thing, but is alone itself by itself. (B12)

The ancients (including Plato and Aristotle) were puzzled by Anaxagoras's treatment of *Nous* (mind). In the *Phaedo*, Plato's Socrates ridicules Anaxagoras for failing to make proper use of *Nous* in his account of the world (A47), and the ancient tradition that nicknamed Anaxagoras *Nous* ('Mr Mind') could be seen more as mockery than as a mark of admiration for his great understanding. Some of the ridicule and perplexity is understandable. Socrates was looking for teleological explanations and thought that any appeal to mind or *nous* must have a teleological component that would explain why it is best that things are arranged as they are; that he did not find it in Anaxagoras was enough to cause great disappointment. In *De Anima*, Aristotle (A100) complains that Anaxagoras was unclear, speaking of both soul and *Nous* as efficient causes (in the Aristotelian sense). Aristotle and Theophrastus were perplexed about the mechanics of knowing and perceiving in Anaxagoras, and neither seems to find a clear account of intellection in the text of Anaxagoras that they knew.[1] Modern readers are also puzzled. In our case, the problems are compounded by the usual problems of studying the Presocratics: the lack of texts, the problems of dealing with ancient treatments heavily influenced by Aristotle, and so on. So, for

1 For a discussions of Aristotle and Theophrastus on Anaxagoras, see Laks 'Mind's Crisis' 19–25, along with 'Fonctions' 21–29, and Baltussen. A short discussion of Aristotle on Anaxagoras in *De Anima* can be found in Clark.

us, it can be comforting to find that our ancient predecessors also had difficulties in understanding Anaxagoras's views. Nevertheless, we need to try to determine as best we can what *Nous* does in the Anaxagorean system, how it does it, and what it must know in order to do its job.[2]

Anaxagoras mentions or discusses *Nous* in B11, B12, B13, and B14. B12 is the longest extant passage of Anaxagoras and most of it is concerned with *Nous*: its nature, its powers (both efficient and epistemic), and its role in the cosmic separations. One of the most important aspects of *Nous* is its independence; it, alone, is not mixed with everything else and it does not partake of everything else; as B11 says, 'in everything there is a share of everything except *Nous*, but there are some things in which *Nous*, too, is present.' Here in B11 Anaxagoras makes the point in terms of all things having a share of all things, but a reference to mixture comes right at the beginning of B12 ('the other things have a share of everything, but *Nous* is unlimited and self-ruling and has been mixed with no thing'), and in Simplicius the opening line of B12 follows hard on B11. So, we should understand the notion of having a share of something as a way of referring to the mixture of one thing with another (and indeed to the mixture of all things in all things). It is crucial for Anaxagoras, whose cosmology is built on this mixture of all things, that *Nous* is *not* subject to the principle that all things were and are now together in the sense of partaking of everything; otherwise, he tells us, *Nous* could not perform its job. Nevertheless, Anaxagoras also stresses that *Nous*, even though it is not mixed with anything else, is (first) *in* some other things, and (second) 'is even now where all the other things also are' (B14). This means (first) that some things (human beings and other living things) somehow have *nous* in them, though not as a mixed component part as everything else is a component part; and (second) that *Nous* pervades and is ever present in the cosmos, as the discerning, controlling, and knowing force that B12 describes. So, however we analyse *Nous*, we will need to account for these characteristics: it must be separate yet, at the same time, capable

2 The focus here is on Cosmic *Nous*, what we might call 'big *Nous*'; nevertheless, certain points will also apply to 'small *nous*' – *nous* in us and all other living creatures, 'as many as have soul,' as Anaxagoras puts it in B4a and in B12. We might also distinguish between *nous* in human beings and *nous* in other living things ('small *nous* and 'yet smaller *nous*'?). The major differences will have to do with intellection: how much we, as opposed to Cosmic *Nous*, can know, what constitutes *nous* for plants and animals, and the possible role of *nous* or soul as the directing force in seeds. It is here, I think, that Aristotle's questions about the differences between soul and *nous* in Anaxagoras become most pressing.

of being present in other things; it must be pervasive without sharing in or being mixed with, other things; and it must have the strength, purity, and intelligent powers that Anaxagoras's claims in B12 give it.

4.1 Understanding *Nous*

In B12 Anaxagoras assigns two important functions to *Nous*. It begins and controls the rotation that causes the separations off and re-mixtures that produce the cosmic processes as we know them. Then, in addition to its role as initiator of motion, *Nous* is intellect; that is, it has capacities for knowing and deciding.[3] It is important to note that, for Anaxagoras, these two roles are equally important.[4] *Nous*'s power to cause change makes it possible that there is an ordered universe; its power to know guarantees that the resulting universe is intelligible. Although Anaxagoras makes clear that these are both crucial activities for *Nous*, he does not, at least in the extant fragments, explain fully how *Nous* knows or how it causes motion and change. He says that *Nous* 'maintains all discernment (*gnōmē*) about all things' and that *Nous* 'knew (*egnō*) them all: the things that are being mixed together, the things that are being separated off, and the things that are being dissociated.' These claims in B12 suggest that, for Anaxagoras, the making of the sensible world is a foreseeable effect of the separation that *Nous* instigates; further, the discussions in B12 make it likely that *Nous* began the rotation because it knew that this development would occur. Clear philosophical motivation for these claims can be found in Parmenides. Not only does Parmenides claim that there must be some reason for cosmic change (see DK 28B8.9–10), he also obviously connects what is metaphysically basic with what is epistemologically basic (see 28B3, B8.34–36). A cosmic intelligence that is also a motive force responds to both

3 In what follows, I shall assume that both of these functions are part of the workings of *Nous*, although that assumption has been challenged, especially by Silvestre. A clear discussion and critique of that account is to be found in Laks 'Mind's Crisis.'

4 Relying on the fundamental ancient Greek conception of *nous* as a critical faculty that distinguishes things, and noting connections between intellectual *krisis* (decision or judgment) and cosmological *diakrisis* (separation off), Laks argues that the cosmic revolution is instigated by *Nous in order that* it may come to know the things in the original mixture; thus, world-making is secondary to understanding (see 'Mind's Crisis' and 'Fonctions'). *Nous* separates ingredients in order to know them, but because the separations can never be complete, Laks argues that *Nous* works in vain ('Crisis'). On Laks's view, Anaxagoras attributes to *Nous* a desire to bring about what is, in fact, impossible. For further discussion and criticism of Laks's view, see comments by DeFilippo in his 'Reply' to Laks; Lesher in 'Mind's Knowledge' 128–30, esp. 129, Louguet 516–17, and Curd *Legacy* 142–44.

of these theoretical needs. This provides links between *Nous*'s judgment, knowledge, and strength in B12.[5]

The notion of a pervasive and controlling cosmic intelligence is present in several of Anaxagoras's predecessors, including Xenophanes, Heraclitus, and Parmenides; Anaxagoras may differ in making his claims more specific and giving his force the name of '*nous*,' but he is following a tradition.[6] The cosmic forces of Xenophanes and Heraclitus both understand and guide the universe; their intelligence is both theoretical and practical (as we might put it).[7] Similarly, Anaxagoras's *Nous* has all discernment and all control (as B12 claims); therefore, it has all strength.[8] What Anaxagoras must do is to show that there is nothing to thwart *Nous*, no other power that could

5 Lesher argues that the text of B12 seems merely to list the various characteristics of mind rather than offering arguments (or even grammatical particles) that connect them in any orderly fashion (see 'Mind's Knowledge' for Lesher's arguments).

6 The classic accounts of the knowing and recognizing powers of *nous* in early Greek thought are in the studies by Von Fritz. His general view is rightly challenged by Lesher in 'Emergence' and 'Perceiving and Knowing.' In 'Mind's Powers' Lesher summarizes his interpretation of *nous* in early Greek thought and applies it to Anaxagoras: 'Homer's paragons of [*nous*] are models of practical intelligence, persons who can learn from experience, sense the troubles that may lie ahead, and conceive and execute measures that will bring success ... It should come as no surprise, then, that Anaxagoras would characterize the operations of his cosmic *nous* in terms of controlling and ordering the events taking place in nature, for controlling and ordering is what *nous* typically does, indeed it is what *nous* had always done' (132–33). On the novelty of Anaxagoras's use of '*Nous*' for his controlling power, see Betegh 281. In chap. 7 of his book on the Derveni Papyrus, Betegh discusses the possible relations between Anaxagoras's *Nous* and the Derveni author's cosmic god or Mind, along with other connections between the theories of Anaxagoras and the views promulgated in the papyrus.

7 Xenophanes' god is completely unlike human beings; yet sees and hears and thinks as a whole, and shakes all things by the thought of his mind (DK 21B23, 24, 25; I take 21B23 to claim that Xenophanes' god has no body). In Heraclitus, the thunderbolt, the traditional sign of Zeus, steers all things (22B64); that which is wise is one and both willing and unwilling to be called by the name of Zeus (22B32); fire is connected with the *Logos*, knowledge of which is wisdom (22B1), and which is the account of how all things are ordered and measured in the *kosmos* (see 22B1, B30, B41). For further accounts of Xenophanes and Heraclitus, see the volumes by Lesher (on Xenophanes) and Robinson (on Heraclitus) in this series.

8 Lesher argues that in order to understand the connection between Mind's discerning judgment (*gnōmē*) and its strength, we should take Anaxagoras's claim that *Nous* has '*gnōmē* concerning all things' as asserting that *Nous* possesses wise or intelligent decision-making, that is, it holds every decision concerning everything that occurs in the cosmos. For Lesher, the connection lies in the efficacy of *Nous*'s intelligence. Like Socrates, Lesher's Anaxagoras must claim that wisdom will guarantee action, and indeed right action (Lesher refers to Socrates' claims in the *Protagoras*, Plato's claims about wisdom and action in the *Republic*, and Aristotle on *phronēsis*). Thus, for Lesher, that

interfere with its workings (as Love and Strife interfere with one another in Empedocles). As we shall see, by denying that *Nous* is mixed with or has a share of anything, Anaxagoras begins that task, and, if he can argue that all change is ultimately linked to *Nous*, he may be able to complete it. Nevertheless, we should not stress the practical aspects of *Nous* at the expense of the cognitive. It is what *Nous* knows that allows it to engage in the crucial wise decision-making that is one of its tasks.[9] Without an analysis of this capacity, and without recognizing that it must involve genuine knowledge of the natures of the metaphysically basic ingredients in the original mix, we cannot fully understand either Mind's knowledge or its powers of control.

4.2 What Things Have to Do with Mind

We must understand both that *Nous* practises critical discernment and that its holding all discerning judgment or knowledge about all things has a practical aspect as well as an intellectual one. Yet we may still ask what it is that *Nous* knows and how it knows it. The details of B12 will provide some clues. After its two opening sections (claims and arguments about *Nous*'s unmixed state, and statements of its characteristics, to both of which we shall return), Anaxagoras focuses on the role of *Nous* in the cosmic revolution. The move from claims about *Nous*'s character to *Nous*'s cosmic role is made by first remarking that '*Nous* has control over all things that have soul, both the larger and the smaller.' Anaxagoras begins by reminding the reader of the role that mind plays in ourselves and in other living creatures. Just as in the case of the everything-in-everything doctrine, Anaxagoras begins with what is familiar to us (facts about nutrition, etc.). He then uses that information to build a cosmic theory that not only explains sense experience but is also consistent with the Eleatic metaphysical requirements that he accepts; as B21a puts it, appearances are a sight or glimpse of the unseen. In the case of *Nous*, we are familiar with the workings of mind in our own lives, how it organizes us, and governs motion, decision-making, and so on. Anaxagoras then exploits that experience in asserting that, just as our lives are lived under the control of *nous*,

Anaxagoras goes on to claim that *Nous* (therefore) has the greatest strength is entirely natural. (See 'Mind's Knowledge.')

9 In the last paragraph of 'Mind's Knowledge' (142) Lesher acknowledges that *Nous* must possess knowledge, saying that it 'must have enjoyed some degree of awareness of individual entities as it went about its work,' and that the claim at the end of B12 (that each thing 'is and was most manifestly those things of which there are the most in it') would be incoherent if there were no intelligence capable of grasping 'the identity of ingredients in their pure state.'

so it is with the *cosmos*: '*Nous* controlled the whole revolution, so that it started to revolve in the beginning.' If we take seriously the juxtaposition of the claim about *Nous* controlling whatever has soul and controlling the whole revolution, we can see that Anaxagoras thinks of the behaviour of the cosmos as on a par with the life of an organism ('whatever has soul') organized and managed by its own particular *nous*. Just as with us, the control of the cosmic revolution and the resulting ordering of the universe is explicitly linked with what *Nous* knows: 'And *Nous* knew them all: the things that are being mixed together, the things that are being separated off, and the things that are being dissociated. And whatever sorts of things were going to be, indeed whatever sorts were and now are not, and as many as are now and whatever will be, all these *Nous* set in order.' The assertion that *Nous* knew them all (*panta egnō nous*) is fundamental, for it is this that brings together the metaphysical and cosmological aspects of Anaxagoras's theory. The standard translation and understanding of this phrase have been challenged; Lesher, for instance, argues that it is best to translate Anaxagoras's claim here as 'Mind decides or determines everything, the things being mixed, separated, and divided off.'[10] Lesher argues for this by saying that once Anaxagoras has given *Nous* the power to arrange and control, 'it would have been something of an oversight for Anaxagoras not to credit Mind with deciding how the individual portions get distributed.'[11] There are at least three difficulties with Lesher's proposal. First, that *Nous* makes the decision about everything has already been asserted in the earlier claim that *Nous* holds every discerning judgment about all things; Anaxagoras does not need to make that claim again. Indeed, he needs something stronger. Second, *Nous*'s judgment and decision-making can hardly be discerning if it does not have knowledge about and insight into the things concerning which it makes decisions (this is the stronger claim that Anaxagoras needs). Third, the passage we are considering says nothing about 'individual portions.' Rather, it discusses the things that are in and that will emerge from the original mixture as a result of rotation that *Nous* begins. These are the original ingredients and then the results of the mixtures and separations that Anaxagoras links with phenomenal coming-to-be and passing-away in B17.

The second point is the crucial one. As the source of cosmic order, and as holder of every decision about all things, *Nous* cannot simply be a

10 Lesher 'Mind's Knowledge' 139. According to Lesher, in light of his earlier analysis of *gnōmē*, Anaxagoras's use of *egnō* here is linked to a use of *gignōskein* in its 'secondary sense of "judge, determine, decide."'

11 Ibid. 140.

blind efficient cause (as we might anachronistically put it). Its causation must be based on understanding; the decisions it makes must themselves be orderly and rational. As such, they must be grounded in knowledge about the things being ordered, what they are, how they characteristically behave, and so on. In short, what *Nous* must know so as to order the cosmos in a coherent and rational way is what each of the things in the original mix really is; that is, *Nous* must have genuine knowledge of the nature of each component. Only if it knows this can it know at each stage of cosmic development what is being mixed, separated, and dissociated.[12]

Remembering that Anaxagoras adopts Eleatic requirements for his basic entities and engages in rational cosmology will help us to recognize the epistemic power of *Nous* with respect to the constituents of the original mix. Parmenides had argued for a fundamental connection between what genuinely is and what is knowable.[13] In claiming that *Nous* has the sort of knowledge attributed to it in B12, Anaxagoras recognizes and accepts the force of Parmenides' epistemological arguments, just as he recognizes the Eleatic metaphysical principles in B17 when he asserts that '[t]he Greeks do not think correctly about coming-to-be and passing-away; for no thing comes to be or passes away, but is mixed together and dissociated from the things that are.' In order for Anaxagoras's cosmology to be rational, he must begin with basic entities that meet Parmenides' metaphysical and epistemological requirements for what-is. These are the things in the original mix (as well as *Nous* itself), and while B17 points out their character as metaphysically basic, the claims about *Nous*'s knowledge in B12 stress their equally important status as epistemologically basic.

The entities in the original mix are ingredients of the phenomenal things that we perceive in the world around us; these phenomena are mixtures, produced by the mixture and breaking up of the things that separate off from the original mix. Even such masses as the earth, water, air, and fire around us are mixtures, each getting its name from the predominant

12 Laks ('Mind's Crisis') denies exactly this knowledge to *Nous* by claiming that *Nous*'s activity is undertaken in vain, because there can be no pure or unmixed ingredients. Louguet suggests (516) that such knowledge implies a distinction between pure and mixed ingredients, which is absent in Anaxagoras. It is true that Anaxagoras says that all things are mixed, and it is true that there are no pure instances of ingredients. Nevertheless, as we have seen in Essay 2, this does not mean that an analysis of an ingredient as though it were in such a pure state could not be given. If the ingredients are genuinely real, they must be genuinely knowable, and the knowledge that *Nous* has could be a direct insight into the nature of the thing rather than based on examination of a pure instance of an ingredient.

13 Parmenides DK 28B2, B3, B4, B6, B8.

ingredient in the mix (see B12). Biological entities, plants, animals, and human beings (as many as have soul), are equally artefacts, put together under the direction of seeds (which are biological starting points, perhaps endowed with *Nous*). All these artefacts come to be (as it were) and pass away (as it were) through the mixture and separation of the ingredients that were present in the original mix; these mixtures and separations are themselves the result of the big cosmic separation that occurs once *Nous* sets the original mass (the cosmic soup) in motion; that is, once *Nous* begins the rotations that are discussed in B12 and 13 (and elsewhere). *Nous* can *direct* and organize all this rather than just *cause* it only if it knows the natures of the basic entities and how they behave. As Parmenidean basic things they have natures that can be known; this is suggested by a comment in Simplicius. In his commentary on *de Caelo*, worrying about what Anaxagoras could mean in B1 in saying that all things were unlimited or infinite, Simplicius quotes B7, and says this:

> Perhaps by unlimited he means what is incomprehensible and unknowable to us. This is shown by the statement, 'so as not to know the extent of the things being separated off, either in word or in deed.' Anaxagoras makes it clear that he thought that they were limited in form when he says that *Nous* knows them all. And indeed if they really were unlimited, they would be altogether unknowable; for knowledge defines and limits the thing that is known.

Following this comment, Simplicius quotes the part of B12 that has concerned us. Saying that the things in the original mix 'are limited in form,' is, I take it, Simplicius's recognition that Anaxagoras makes each ingredient a basic entity, having a genuine, unitary nature that is both knowable and known by cosmic *Nous*. Knowing these natures, *Nous* can proceed in its task of world-making, by beginning the rotation that causes the separating off that ultimately produces the sensible world.

4.3 Minding Things

It remains for us to consider how *Nous* can perform its task of knowing the original natures as well as all the things being produced by the revolution, how it can guide and control the revolution, and how it can be thought of as a cause present in the universe even now. We can begin to sketch an answer by looking at three relevant texts:

> B11: In everything there is a share of everything except *Nous*, but there are some things in which *Nous*, too, is present.

B12 (part): The other things have a share of everything, but *Nous* is unlimited and self-ruling and has been mixed with no thing, but is alone itself by itself. For if it were not by itself, but had been mixed with anything else, then it would partake of all things, if it had been mixed with anything (for there is a share of everything in everything just as I have said before); and the things mixed together with it would thwart it, so that it would control none of the things in the way that it in fact does, being alone by itself. For it is the finest of all things and the purest, and indeed it maintains all discernment about everything and has the greatest strength. And *Nous* has control over all things that have soul, both the larger and the smaller ... But there are many shares of many things; nothing is completely separated off or dissociated one from the other except *Nous*. All *Nous* is alike, both the greater and the smaller.

B14: *Nous*, which always is, most assuredly is even now where all the other things also are, in the surrounding multitude, and in the things that were joined together and in the things that have been separated off.

These passages show (1) that *Nous* is neither mixed with nor has a share of anything else (B11, B12); (2) that it is, nevertheless, in some things (B11), and (3) that it is ever present in the cosmos (B14). B12 contains the fullest discussion of *Nous*, and provides clues as to how we ought to think of it. Anaxagoras says that *Nous* is the finest of all things and the purest; it is unlimited and self-ruling; and these are characteristics that point to its utter difference from the things that constitute the original mix. Nothing else in that mix (or at any other time) is pure, as everything has a share of everything else; and *Nous*'s fineness is surely a mark of its subtlety and ability to be 'in' other entities in a way different from the mixed ingredients that constitute those entities. Anaxagoras is trying to say something important and fundamental about *Nous*. Unlike some commentators, I do not think that *Nous* is material, a 'stuff' on a par with the other stuffs that constitute the ingredients of Anaxagoras's cosmos. In adopting a moving cause, Anaxagoras, like Empedocles, distinguishes between the material ingredients that make up the cosmos and the non-material force or forces that move them.[14] The claims at the opening of

14 Love and Strife are non-material moving forces; see Wright *Empedocles* 32–34 (for fuller discussions of Empedocles, see Wright, as well as Inwood's volume in this series). On the non-bodily character of *Nous*, see for instance Guthrie and also Furley 'Soul.' That Anaxagoras claims that *Nous* is the finest and purest of all *things* does not force us to think of *Nous* as material; Anaxagoras has already argued that *Nous* is importantly unlike all the other *chrēmata* insofar as it is not mixed with or partake of shares of the other things. Making *Nous* non-material would guarantee that its difference in that respect is already built into it, as it were. See notes on B12.

B12 are designed to emphasize *Nous*'s difference from other things and to indicate that if it were of the same order as the other ingredients it would be unable to perform its tasks of knowing, deciding, ordering, and moving everything else. It is this that Aristotle has in mind when he praises Anaxagoras in *De Anima* 3.4 429a18: 'It is necessary then, if it (*nous*) is to think (*noei*) all things, that it be unmixed just as Anaxagoras says, in order that it might rule, that is, in order that it might know.'[15] Were *Nous* simply another ingredient, it could be swamped by the other materials in the mix; Anaxagoras seems to think that *nous* would be a comparatively small presence as a component of physical objects, and if he were to treat its occurrence in the world in the same way as he treats the other things, *Nous* would never be able to dominate, being overcome and thwarted by the sheer numbers of the other ingredients. Claiming that predominance of ingredient establishes the phenomenal character of an object, Anaxagoras must find a way to show that *Nous*, which never appears as just itself (its presence is always indicated by the activity of a living thing, not by its material make-up), is nevertheless strong enough to control the organism, just as perception (and direct experience) tells us that it does. Adopting a non-material intelligent force is just the solution that Anaxagoras needs. Then, having opted for a non-material *Nous* that is independent of all other things, he needs to explain how it operates in the world.[16]

In addition to saying something about the nature of *Nous* (its purity, fineness, and independence), B12 also points to its character as a moving force. That *Nous* is *apeiron*, not subject to limits, allows it to operate anywhere and at any level. Moreover, although it rules and controls everything else as an independent and external force, it is subject to no control but its own.[17] Perhaps Anaxagoras sees the problems in an infinite regress

15 For a discussion of the way that Aristotle's *Nous* knows (at least in *Met.* 12.9), see Kosman.

16 Barnes claims that *Nous* is a stuff, and that although *Nous* is not mixed with things (so it does not have a share in everything else), other things can have (share in) a portion of *Nous* in just the same manner as they share in or have a portion of everything else (*Presocratic* 407–408). 'If mind is "in the surrounding multiplicity" and in everything else, then surely every piece of stuff must contain a portion of mind ... [This] ... is both intelligible in itself and consistent with everything else that Anaxagoras has to say' (408). I do not think that B11 or B12 support this view, nor does B14 force us to adopt it. B11 makes it clear that it is not the case that 'every piece of stuff' must contain a portion of mind.

17 *Nous* does not create the ingredients in the mix; but because it controls the rotation, it controls the separation and the mixtures and dissociations that result from that separation. A good discussion of this may be found in Louguet.

of causes, and makes *Nous* a self-controller and thus a self-mover. Why has this cosmos developed as it has? Because *Nous* began the rotation that produced it. What brought it about that *Nous* began the rotation? No force external to *Nous* can or need be appealed to here. As we have noted, in order to operate on things in the world, *Nous* needs to be in that world, but not in the same way as the other things. In both B11 and B12, where Anaxagoras denies that *Nous* has a share of things, he uses the language of portions: everything else has a share of everything else, and there are many shares of many things. This means that each thing has many shares or portions; indeed, some of everything that there is. Speaking of *Nous*, Anaxagoras says that *Nous* is *in* some things, and the 'in' language is applied to the other things; but the language of parts or shares does not apply to *Nous*; it does not partake of anything else (nor, apparently, do other things 'share in' or 'partake of a share of' *Nous*). Its presence in the cosmos is then not a matter of other things participating in it, or it in anything else. Rather, it seems to be an ever-present organizing force, just as B12 would suggest. B14, which despite textual problems, can be understood as insisting that *Nous* is indeed ever present, is a continuation of the discussion of *Nous*'s cosmological role that began in B12. B11, by contrast, can be understood more locally (as it were). Everything has a portion of everything else, but that 'everything else' does not include *Nous* because it is not a thing on a par with the others. Nevertheless, in some things, that is, living things ('as many as have soul'), *Nous* is present as a ruling, organizing, and discerning component (in some living things there is also knowledge; this may depend on the concentration of *Nous* in the creature).[18]

Aristotle complains that Anaxagoras does not appeal to *Nous* as an explanatory device in physics once the cosmic rotation has begun (and a similar view is suggested by some of what Plato has Socrates say in the *Phaedo*). Simplicius (perhaps inadvertently) gives us a defence. In the context of B13 (*in Phys*. 300.27), Simplicius argues against Alexander of Aphrodisias, who says that in the passage of Aristotle's *Physics* that Simplicius is discussing here (194a15), Aristotle was not referring to Anaxagoras, 'even though Anaxagoras set *Nous* among the first principles; perhaps, Alexander says, because Anaxagoras makes no use of it in coming-to-be. But it is clear that he uses it, because he says that coming-to-be is nothing other

18 In Essay 2 I suggested that *Nous* is also present as an organizing component in seeds, which is what makes a seed just what it is rather than a random collection of ingredients. Anaxagoras's rejection of the notion that *Nous* can be mixed with things may constitute a repudiation of Parmenides' account of knowing in 28B16 (probably part of the *Doxa*); see Furley on this point.

than separation, that separation comes to be on account of motion, and that *Nous* is the cause of motion.' This seems exactly right. *Nous* is the first cause, and once the cosmic rotations and whirls have begun, mechanistic causes can be brought in as explanations. Still, as Simplicius notes, *Nous* is the first and fundamental cause, and thus the ultimate explanatory principle.

One thing that Anaxagoras does not say, at least in our fragments, is that *Nous* is impassible. It is *Aristotle* who says that *Nous* is impassible, and he wonders how *Nous* can then perceive or know. Anaxagoras indeed says that *Nous* is not like the other things; it is independent, and is unaffected by them in the sense that they can neither control nor thwart it; and I suspect that these assertions are the source of the impassibility claims. Anaxagoras fits uneasily into the Aristotelian-Theophrastean template for explaining perception and knowledge; Aristotle's returning to Anaxagoras several times in the course of his discussions in book 1 of *De Anima* are evidence of this. If *Nous* really is immaterial, and is a component in perception, the Aristotelian explanation of perception on the model of touch would not be very helpful, and so we can see how his insistence that *Nous* is metaphysically different from the other ingredients of the original mix could raise difficulties.

Two questions remain. First, how does *Nous* know? Anaxagoras does not tell us, and the little we have (from Theophrastus and Sextus) of his theory of knowledge and perception is not clear; but he is neither the first nor the last philosopher to have difficulties in explaining these things.[19] The immateriality of *Nous* plays a role here. For Anaxagoras, perception is via the opposites; Theophrastus tells us this and also that, for Anaxagoras, all perception is accompanied by pain or discomfort. This suggests that perception must require the direct stimulation of the sense organ by the thing perceived (again touch is the model). Yet knowledge is of things that are both far off as well as present. This is as true of us with our limited (or little) *nous* as it is of *Nous*, the controller of the cosmos. Knowledge can be assisted by sense experience (as B21a suggests), but is not limited to it. So, it must be explained on a different model. Moreover, the things of which *Nous* must have knowledge (the natures of the things in the original mix) cannot be perceived by the senses. So, both *Nous* itself and its means of knowing must be importantly different from bodies and sense

19 See Kosman (317) on the intentionality of Aristotle's *Nous* (a problem not unrelated to the one considered here with respect to Anaxagoras): 'The problem of how to give a correct account of this phenomenon is ... a prime philosophical minefield, strewn with the bodies of many theories, or at least populated by many theories, each claiming to have exploded all others.'

perception. My suspicion is that Cosmic *Nous*'s awareness of the world is a complete and direct apprehension of it; just as *noos* in Parmenides, when correctly used, can grasp and understand what-is.[20] In this way, too, Anaxagoras has a system that is similar to those of Xenophanes and Heraclitus and perhaps to that of Parmenides as well. Because of its apprehension of the natures of the unlimited and completely mixed things in the original mix, *Nous* can create order through the cosmic rotations that it initiates. It can do this because it already knows the contents of the original mix; indeed, without that prior knowledge *Nous* could not engage in world-making.[21] It has been suggested that the knowledge that *Nous* enjoys is something like the knowledge of the laws of nature (as well as the characters of the original things that are).[22] This makes it less than the teleological force that Socrates wanted. Nevertheless, such knowledge would allow it to operate just as Anaxagoras suggests in the fragments, bringing about and directing an ordered cosmos in a minimal sense, insofar as things happen in a systematic and law-like fashion. *Nous* in us, perhaps by being in us (and lacking the unimpeded cosmic perspective of big *Nous*), is not able to know everything; we are limited to what we can perceive and what we can work out intellectually on our own in our brief lifespans (B21, B21a). But our *nous* is enough like cosmic *Nous* for us to share in and have some understanding of its powers and possibilities.

Finally, why were Plato and Aristotle so disappointed with Anaxagoras's account of *Nous*, and was this disappointment justified? Plato certainly thinks that a complete explanation will be an external teleological theory that will make clear not only that there is order in the universe, but also why, and why the order of the cosmos is a good (and in fact the best) order. Ultimately, Plato relies on the Form of the Good as such an ordering device. In Plato's view, in order to be practically wise and efficacious in ordering things for the best, one must have a conception of the nature of the good itself. It is this grasp of the nature of an independent or external good that Plato sees as missing in Anaxagoras's theory. The evidence that we have suggests that, in this sense, Plato's analysis of Anaxagoras's view is correct. Yet, it is not clear that a commitment to an independent principle of the good is necessary for a teleological account of the cosmos.

20 Von Fritz's notion of knowing or understanding as a complete realization of a situation may come into play. Aristotle's account of complete understanding in the Unmoved Mover is also relevant.

21 I can *sort out* the contents of a closet without already knowing what is in the closet. That is cleaning out; to *arrange* the contents, I must know the contents.

22 See Sider 137; Louguet 515–16.

Aristotle, who certainly adopts a teleological account of nature, denies the existence of such a good. For him, the final good of a thing is an internal principle of orderly development. For Aristotle practical wisdom indeed requires a conception of a good. If I *decide* to go for a walk, it is because I suppose walking to be a good (either instrumental or intrinsic). Nevertheless, Anaxagoras's case of cosmic *Nous*'s decision-making or judgment may be importantly different from my decision to go for this walk here and now. In the case of the cosmos, which is identical with what there is, there is no good that is independent of the whole system. The plan that *Nous* may have and that is carried out in great revolutions of the mass of ingredients is internal to and identical with those occurrences. In a similar way, the final good for a living organism in Aristotle is realized just in the organism's living its own type of life, determined by the form (or soul) of that organism. It is at this point that Aristotle's criticism of Anaxagoras becomes relevant. Aristotle's own account of soul carefully distinguishes three aspects of soul: nutrition, perception, and intellect. Discussing Anaxagoras in *de Anima*, Aristotle complains that Anaxagoras's account conflates efficient causes (motion) with epistemic reasons (knowledge). Aristotle further notes (also A100) that Anaxagoras fails to discriminate adequately between mind and soul because 'he often says that mind (*nous*) is the cause of the fine and the right, but elsewhere he says that this is soul; for he says that *nous* belongs to all animals, both the great and the small and the worthy and the less worthy' (A100). Here the complaint is that Anaxagoras does not distinguish among (1) teleological explanations of the good for a thing, (2) moral good or value, and (3) choice about right action. Aristotle argues that 'mind (*nous*), in the sense of practical intelligence (*phronēsis*), does not appear to belong equally to all animals, nor even to all human beings.' Again, given our evidence, Aristotle's complaints seem justified. Yet, despite his complaints, Aristotle notes that, in finding any place for *Nous* in his theory, Anaxagoras is worthy of praise. 'When someone said that *Nous* is present – in nature just as it is in animals – as the cause of the cosmos and of all its order, he appeared as a sober man among the random chatterers who preceded him' (A58).[23]

23 Aristotle does not say that Anaxagoras was the first to hold such views: 'Hermotimus of Clazomenae gets the credit of holding them earlier.' In his commentary on the *Metaphysics* (1:136), Ross says of Hermotimus, 'We have no independent confirmation of this story about Hermotimus. He was a highly legendary personage, whose soul was said to have often left his body and acquired information of events at a distance ... The connexion between him and Anaxagoras probably is simply that the separation of his soul from his body was thought to furnish an analogy to Anaxagoras' distinction of mind from matter.'

5

Anaxagorean Science

Appearances are a sight of the unseen. (B21a)

The fragments and testimonia demonstrate how Anaxagoras set out to provide a comprehensive explanation of the world as it now is. In beginning with metaphysics and then moving on to cosmogony, cosmology, meteorology, biology, and other scientific inquiries, Anaxagoras was apparently following a pattern found in the earliest Presocratic theories, and which continued through Plato.[1] The testimonia, our major source for Anaxagoras's scientific views, reveal his interest in an extraordinary variety of phenomena, from the motions of the planets and fixed stars, through earthquakes, thunder and lightning, to the processes of perception in living things.[2]

5.1 Making a World

Everything that occurs in Anaxagoras's universe can be traced to the continuing rotation of the original mixture. This motion causes what Anaxagoras calls the separation off (*apokrisis*) of ingredients; that separating off and the resulting recombination through mixture (*summixis*) and compaction (*sumpagēnai*) eventually produce the earth, stars, planets, and,

1 No Presocratic system survives in its entirety, so we cannot be sure that there was a usual pattern for the order of explanation that theories followed. But hints from Simplicius about the placements of fragments in various thinkers suggest that many began with metaphysical claims and then moved on to cosmogony and then to explanations of physical phenomena. Kahn (*Anaximander*) has pointed out that the pattern was apparently set by Anaximander; it is tempting to see Plato's *Timaeus* as following this tradition.

2 The evidence for Anaxagorean science is, at best, sketchy, and many details are lost; but we can begin to reconstruct it from the surviving evidence.

indeed, all the phenomena of the sensible world. Because it is the rotation itself that produces all these effects, one could reasonably argue that the system is simply mechanistic, but Anaxagoras makes it clear in B12 that '*Nous* controlled the whole revolution, so that it started to revolve in the beginning,' and he ties this control to *Nous's* knowledge of the things in the mix and what will happen as a result of the rotation:

> And *Nous* knew them all: the things that are being mixed together, the things that are being separated off, and the things that are being dissociated. And whatever sorts of things were going to be, indeed whatever sorts were and now are not, and as many as are now and whatever will be, all these *Nous* set in order.

In the broadest sense, then, through causing the motion that results in the features of the universe, *Nous* is responsible for all of them.[3] The original mix is indefinite or boundless (*apeiron*) in extent and motionless (suggested by B13; reported in A45, A48, A59, A64; see also Aristotle *De Caelo* 301a12). At some point, *Nous* decided to set the mass in motion, and the revolution caused the mass to begin to dissociate and the ingredients to begin to separate off (both *diakrinesthai* and *apokrinesthai* are used in B12 and 13). According to B12, the revolution began in a small region; the rotation then spread and will continue to spread through the indefinitely large mass of stuff, with the greatest speed at the leading edges of the revolving mass (suggested by B9).[4] The swiftness and force of the rotation cause the separating and dissociating:

> When *Nous* began to move [things], there was separation off from the multitude that was being moved, and whatever *Nous* moved, all this was dissociated; and as things were being moved and dissociated, the revolution made them dissociate

3 This is a point that Simplicius makes in defending Anaxagoras against Alexander of Aphrodisias's comment that Anaxagoras makes no use of *Nous* in coming-to-be (at *in Phys.* 300.27ff.). Yet Simplicius also comments in A47 that 'Eudemus reports that despite having allowed for *Nous*, Anaxagoras introduces the agency of chance for most things.' It is clear that Anaxagoras's system is not fully teleological in the Platonic or (even) the Aristotelian sense.

4 Although there is no text that says so explicitly, it would seem that the rotation increases in speed as it increases in size. B9 shows that there are different speeds and forces in different areas of the whirl: 'as these things are revolving in this way and being separated off by force and swiftness (the swiftness produces force), and their swiftness resembles the swiftness of nothing that is now present among humans, but is altogether many times as fast.' This indicates that in the areas farther away from us (thus perhaps at the outer parts of the ever-forming cosmos and at the leading edges of the whirl) the speed is much greater than anything experienced by us here on the Earth. The present tense in B9 shows that the process continues.

much more (B13) ... The dense and the wet and the cold and the dark came together here, where <the> earth is now; but the rare and the hot and the dry <and the bright> moved out to the far reaches of the aether. (B15)

Given that the mixture is a plenum, any dissociation leads to recombination, so there are progressive rearrangements of the ingredients. Separation is never complete, but as the combined masses dissociate and recombine, the rotation tends to throw lighter materials outward to the edges of the whirl and heavier materials into the centre. The whirl gets larger as it goes on, expanding and enlarging the breakup in all directions from what is now the centre, where our Earth is now.[5] The whirl thus produces an expanding, geocentric system.[6] As the rotation continues, the motion and its continuing winnowing effect eventually produce the heavens with our Earth and our celestial bodies. The extant fragments give few details of the formation of these bodies or how the Earth acquired its characteristics (except that B15 shows that heavier ingredients tend to the centre and lighter to the edges of the whirling mass). The testimonia provide more information, and from them a rough picture of Anaxagoras' world (at least as the ancient sources took it to be) can be drawn.

The whirling power of the rotation is crucial. It disperses the materials that become our Earth, stars, planets, and moon; it also provides the force that maintains them in their positions and moves the heavenly bodies in their travels across the sky around (and under) the Earth.[7] It is responsible for holding the Earth in place in the centre. Aristotle, in *de Caelo* (294b14), tells us that, according to Anaxagoras (as well as Anaximenes and Democritus), the Earth is flat and that this holds it in place against the force of the underlying air.[8] Aristotle compares the air under the Earth to that in

5 This is suggested by the claims of B12, B13, and B15. Not all earthy stuff is on (or in) the Earth. Not only is everything in everything so that there is earthy stuff even at the far reaches of the (already separated off) ethereal part of the cosmos, but there is also much earth (along with everything else) in that part of the original mixture that the rotation has not yet reached. The Earth (our Earth) is itself a mix of all the basic ingredients in which earth predominates. The description of the mix of all things (in B1, for instance) holds not only for the beginning state of things, but also for all those (indefinitely large) areas of the mass that the expanding rotation has not yet reached.

6 A short discussion of this can be found in Tigner 'Stars' 33–34 with n. 7.

7 Hippolytus says this explicitly: 'All things partake of motion through being moved by Mind, and the like things come together. The heavenly bodies have been arranged by circular motion' (A42.2). In A64 Simplicius, too, emphasizes the ruling power of *Nous* in the universe.

8 Panchenko argues that a passage from Martianus Capella (early 5th century AD) reproduces at least part of Anaxagoras's argument against the sphericity of the Earth, relying

a clepsydra (a water or wine lifter), and says that it is thus able to bear the weight of the Earth and hold it in place (there is a discussion of the force of air in a clepsydra in A69). The whirling strength of the rotation produces the force against which the flat Earth presses and so becomes immovable.[9]

According to Anaxagoras, the stars, sun, and moon are all stones (the reports in A77 stress the earthy character of the moon), ignited by the force of the whirl in which they are caught up; thus they are burning hot. Many of the testimonia mention Anaxagoras's claim that the sun is fiery hot metal or stone (it was reportedly this claim that was at the centre of the charges of impiety brought against him); not only the sun, but also all the stars, too, have this character.[10] If, as B15 and several testimonia tell us, heavy and dense things tend to collect at the centre (where the Earth is), why are these heavenly bodies stony and earthy and why do they remain 'up' there in the air and aether away from the Earth? Apparently Anaxagoras claimed that the force of the rotation near the Earth snatches material away from the Earth; this earthy stuff is then ignited by the heat of the whirling aether, and this produces the stars, planets, and other heavenly bodies (see A71). This also accounts for why some of them (like the famous meteorite at Aegospotami) sometimes fall out of the sky; in A12 Plutarch explains that the force of the whirling aether holds the stars in place, but that slippage can sometimes occur and the stars can thus break free of the force of the whirl and then fall to Earth. Plutarch appeals to reports of 'an enormous flaming body, just like a fiery cloud' seen in the heavens for the seventy-five days that preceded the fall of the stone at Aegospotami as evidence for the truth of this theory.[11] Pliny, too, reports that there was a comet burning during the period in which the stone fell;

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on the appearance of the rays of the rising and setting sun and moon. The passage (from his *On Geometry* 6.590–92) is consistent with Aristotle's claims in *de Caelo*. I have included it in the Testimonia in this volume: see A87.

9 See Tigner 'Ladle' and 'Stars.'

10 Xenophon, in his *Memorabilia*, is careful to show Socrates disputing Anaxagoras's theory that the sun is a fiery stone and that thus fire and the sun 'are the same.' According to Xenophon, Socrates argues that fire and the sun differ in their effects, and that Anaxagoras was ignorant of the facts that 'a stone in fire neither shines nor lasts for long, but that the sun endures for all time as the brightest of all things' (see A73). Plato too, in his *Apology* (at 26d6–e4), is at some pains to allow Socrates to distinguish his views from those of Anaxagoras (see A35), but his Socrates does not attempt to refute Anaxagoras's views.

11 In A82 Aëtius says that meteors or shooting stars are like sparks in the aether; like sparks, most of them are extinguished (Diogenes Laertius gives the same report in A1.9). Some that are very large and very hot (genuine meteorites) apparently survive to fall to Earth.

he (sceptically) discusses Anaxagoras's supposed prediction of the fall of the stone in A11.

Anaxagoras's whirling system is geocentric; above the flat Earth are the moon and then the sun. Far above them are the planets and the stars.[12] Hippolytus tells us (A42.7) that although the stars are as hot as the sun, we on Earth do not feel their heat because they are so far away; he adds that they also occupy a cooler place. (This is dubious: their part of the heavens should be hotter, given that, according to B15, the light, hot stuff travels out to the farther reaches.) Beneath the stars there are some other heavenly bodies invisible to us that also rotate with the sun and the moon. Two sources (Diogenes Laertius in A1.9 and Aëtius in A67) tell us that the heavens tilted after the initial formation, taking on an inclination to the south. Diogenes Laertius says that 'In the beginning the stars were carried around as though in a dome (*tholos*), so that the celestial pole, which is always visible, was directly over the Earth, but later the axis became inclined.'[13] This has two consequences for Anaxagoras's universe. First, the tilt would account for the appearance of the night sky in the northern hemisphere. The stars and planets appear to rotate around a point (Polaris, the Pole Star) that is not directly overhead. Next, the tilt allows Anaxagoras to account for the disappearance and return of the stars in their repeated journeys from east to west through the heavens by saying that the course of the stars is under the Earth (A42.8).[14] That the sun also passes under the Earth is indicated by A80, where Aristotle criticizes the Anaxagorean (and Democritean) account of the Milky Way. On this account, the light of the stars of the Milky Way is visible to us when the sun is under the Earth; the Earth blocks the sun's bright rays, allowing the dimmer light of those stars that fall in the Earth's shadow to be seen. This implies that all of the stars shine with their own light; B18 and A76 and 77 show that,

12 Except for the claim that the Earth is flat (A87), all this information comes from Hippolytus, who gives us the most information about Anaxagoras's account of the arrangement and behaviour of the heavenly bodies. For the reliability of Hippolytus as a source, see Osborne, Mansfeld (*Heresiography*), and Mueller. If the whirl indeed expands outwards in all directions, it is difficult to think in terms of 'up' and 'down' except from the standpoint of an observer on the Earth.

13 Diogenes Laertius simply says that the tilt was 'later,' after the heavens were formed, and he gives no explanation of why this happened. Aëtius (in A67) says that the inclination towards the south occurred after the cosmos had been compacted and after the animals had emerged. Like Diogenes Laertius, Aëtius gives no account of how the tilt happened; he merely says that the cosmos tilted 'on its own' and surmises that it might have happened 'because of providence' so that different parts would have different climates.

14 See Tigner 'Stars.'

according to Anaxagoras, the moon shines by the reflected light of the sun, and Plato credits Anaxagoras with discovering this.[15] The moon is both fiery and earthy, and it has ravines, mountains, and flat broad places. Aëtius suggests that the uneven surface results from the uneven mixture that constitutes the moon: it is both earthy and cold, and the murky parts of it are mixed with fire.

Both Plutarch and Hippolytus credit Anaxagoras with being the first to give a correct explanation of lunar eclipses; they occur when the Earth comes between the sun and the moon and casts a shadow.[16] Hippolytus also says that, according to Anaxagoras, 'The moon is eclipsed when the Earth blocks the sun's light (and sometimes also when the bodies under the moon do)' (A42.9). These 'bodies under the moon' are invisible earthy bodies (reported twice by Hippolytus, in A42.6 and 9). According to Hippolytus, they rotate with the sun and the moon, but are not visible to us. Such unseen bodies are perhaps part of Anaximenes' account of the cosmos (Aëtius reports on invisible earthy bodies that are carried around in the heavens in DK 13A14), and some commentators have wondered whether they are part of Anaxagoras's theory simply as an imitation of Anaximenes.[17] In some total lunar eclipses the characteristic red glow of a lunar eclipse is not visible. Some have thought that Anaxagoras posited the invisible bodies to explain this phenomenon; in conjunction with the shadow cast by the Earth, they would completely conceal the moon.[18] Although it is possible that this is the reason that Anaxagoras included them in his cosmology, Tigner offers another plausible suggestion about the unseen bodies. We should recall that (according to Aëtius in A71) Anaxagoras claimed that the heavenly bodies, especially the stars, begin as rocks seized

15 For a discussion of the question of the discoverer of the source of the light of the moon, see Graham 'Lumière,' who argues for Parmenides; see also O'Brien 'Derived Light.' Although B18 (if genuine) makes it clear that Anaxagoras thinks that the moon does not have its own light, in passages in A77 Aëtius says that according to Anaxagoras there is fire in the moon and (at DG 2.25.9) calls it a 'fiery solid body.'

16 Plutarch, in his *Life of Nicias*, said that Anaxagoras's was the clearest and boldest theory; he remarks that it was not widely circulated because of the danger to those who 'brought down the divine to unreasoning causes, non-providential forces, and necessary happenings' (A18).

17 Guthrie, for instance, says of the invisible bodies, 'This, of course, is simply taken over from Anaximenes, and should have been rendered superfluous by the correct explanation of eclipses if, as is generally thought, that was the original purpose of their introduction' (2:306–37). In contrast, Kirk, in KRS (156) argues that Anaximenes did not posit invisible bodies.

18 Guthrie and Tigner ('Stars') cite Boll's 'Finsternisse' (Pauly-Wissowa VI 2329; Stuttgart: 1907) for these suggestions.

from the Earth by the force of the rotating whirl. These are then ignited, probably growing even hotter as they rise higher because of the power of the rotation (see Plutarch's testimony in A12 concerning the power of the whirl to ignite stony things and cause them to shine). Once they are high enough and bright enough they will appear as stars, but before that happens they are both invisible and carried along below the stars, just as Hippolytus says in A42. They act in eclipses as others have suggested, but their presence in the theory is neither an inexplicable mystery nor a naive relic of Anaximenes' theory. As Tigner says, 'Anaxagoras' unseen bodies are simply stones on their way to becoming stars.'[19] All of these cosmic phenomena are eventually to be explained by the expanding rotation of the mass of the original mixture. The expanding whirl, begun and governed by *Nous*, both produces and maintains the cosmos.

5.2 Separation Here and Elsewhere

In B4a, Anaxagoras makes the intriguing claim that 'there would be separation off not only for us but also elsewhere.' The full passage is as follows:

> Since these things are so, it is right to think that there are many different things present in everything that is being combined, and seeds of all things, having all sorts of forms, colours, and flavours, that humans and also the other animals were compounded, as many as have soul. Also that there are cities that have been constructed by humans and works made, just as with us, and that there are a sun and a moon and other heavenly bodies for them, just as with us, and the earth grows many different things for them, the most valuable of which they gather together into their household and use. I have said this about the separation off, because there would be separation off not only for us but also elsewhere.

Simplicius quotes the passage (in part or in full) three times.[20] Despite the fact that he uses it to support his claim that Anaxagoras thought that there were both noetic and perceptible separations (a neo-Platonic interpretation that is surely his own rather than Anaxagorean), Simplicius is unsure about what Anaxagoras means. He is certain that Anaxagoras is not referring to another place on our own Earth or to a world that preceded ours (he claims that Anaxagoras's language is incompatible with these interpretations), but

19 Tigner 'Stars' 335. He adds, 'An independent origin for the unseen bodies would be quite superfluous in Anaxagoras' system.' For a fuller discussion of the nature and force of a whirl such as Anaxagoras posits, see Tigner's 'Ladle.'

20 *In Phys*. 34.29–35.9 and 157.9–16; and *in Cael*. 609.5–11.

says that the question is worth further investigation. Rightly, Simplicius's own explanation has been rejected, but there is no consensus about what Anaxagoras meant.[21]

The passage itself is odd, moving from a version of the everything-in-everything principle to a claim that human beings and other animals are compounded (as explained in B17), then to an assertion about cities and works, and a sun and a moon, that are 'just as with us,' and finally to the statement that Anaxagoras says all this because 'there would have been separation not only for us but also elsewhere.' Ideally, an interpretation should help explain why these claims are juxtaposed as they are (if we assume that Simplicius is actually quoting a connected passage from Anaxagoras and not simply mixing sentences together out of sequence). Anaxagoras could be talking about other places on the Earth unknown to us or he could be referring to at least one and possibly many entirely different worlds or world-orders (*kosmoi*), separated off from the original mixture in different regions from the one that we inhabit, but contemporaneous with our own.[22] Perhaps the passage is a thought experiment in which Anaxagoras argues that any world that developed through a Mind-caused separation of the original mixture would be like ours, with no commitment to the actuality of any other worlds.[23] Yet another interpretation suggests that Simplicius is right to argue that Anaxagoras's other worlds are neither other places on the Earth, or in the universe, nor other worlds that preceded our own. Rather, Anaxagoras is claiming that within any compounded thing there are (or can be) micro-worlds just as complicated and

21 For a clear and helpful discussion of Simplicius's view, see Louguet.

22 Cornford ('Innumerable Worlds') and Guthrie (*History* 2) argue for the 'elsewhere on the Earth' interpretation (variations on this include Zeller's view that Anaxagoras meant to say that the moon is inhabited, and Jöhrens's suggestion that the moon and other planets in the solar system constitute 'elsewhere'); Kahn says that Cornford's interpretation is 'entirely satisfactory' (*Anaximander* 52–53). McKirahan finds this view 'the most plausible suggestion' (230). Raven (in KR and KRS) says that this view is 'just possible,' but concludes that 'it seems wisest to follow the guidance of Simplicius . . . and leave the question open' (KRS 80). Burnet opted for the 'multiple worlds' interpretation, as did Gigon and Barnes (*Presocratic* 624 n. 17; Barnes's acceptance of the view is somewhat reluctant). For clear summaries and discussions of the various views, see Schofield 'Revisited' 7–13 and Louguet.

23 Versions of the thought-experiment interpretation are defended in Fränkel, Vlastos ('World'), Furley ('Response'), and Schofield (*Essay*); see also Sider 101. These commentators do not agree in all details on what the thought experiment is designed to show. Criticism of the view can be found in Mansfeld ('Other World'), Louguet, and Schofield ('Revisited'). Schofield had accepted the thought-experiment view in *Essay*, but later rejected it.

structured as our own because there is no limit to smallness; 'complexity is not a function of size,' as Schofield puts it.[24]

If we reject Simplicius's interpretation of different ontological levels (as I think we should), we are faced with the problem of determining why Anaxagoras is committed to other worlds. This should help us determine what sort of other world he is envisioning. One problem is that the ancient testimony suggests that Anaxagoras belongs in the group of thinkers for whom there is only one *kosmos* (see A63 and A64, where Aëtius and Simplicius indicate that for Anaxagoras there is only one world).[25] This might lend support to the account that places Anaxagoras's 'elsewhere' somewhere else on the Earth (or in our solar system), to the thought-experiment interpretation, or to the micro-worlds analysis. Nevertheless, there are objections to these views. Simplicius had already considered and rejected the 'elsewhere on our Earth' interpretation, maintaining that had Anaxagoras meant that, he would have said *the* sun and *the* moon. Yet this argument is not convincing. On the one hand, definite articles are often omitted from references to objects deemed unique;[26] and, on the other hand, in B4a Anaxagoras says, speaking of 'elsewhere,' that '*the* earth grows many different things for them.' A more persuasive objection against placing the 'elsewhere' in another part of our Earth (or on the moon or on 'our' planets) is given by Vlastos, who argues that Anaxagoras's mention of separation at the end of the fragment is cosmogonical and that, therefore, what happens elsewhere must be another cosmic separation producing a world order similar to our own.[27] On those grounds, the referent of 'elsewhere' cannot be another place on our Earth, or on the moon, or on any of the planets of our own cosmic system. The thought-experiment interpretation has the virtue of avoiding contradiction with Anaxagoras's claims about the separation and with the testimonia that assert that there is only one universe for Anaxagoras; but it, too, faces difficulties. Chief among these is the problem of squaring Anaxagoras's language in the passage

24 Variants of this account can be found in Leon, Strang, Mansfeld ('Other World'), and Schofield ('Revisited'). Mansfeld seems to suggest that the worlds within worlds structure can go on indefinitely (see his note 11). Waterfield says of this interpretation: 'however extraordinary it might seem,' it is 'the most likely explanation' of B4a (116).

25 We should perhaps exercise some care in accepting the evidence of lists of doctrines such as in A63 (which goes back to Stobaeus). See comments in Schofield 'Revisited' 7 n. 25. Nevertheless, it is worth noting that whatever Anaxagoras's view about his 'other worlds' was, it received little or no notice in the ancient commentators (perhaps surprisingly).

26 See Schofield ('Revisited' 3–4) and Louguet (505 and n. 21).

27 Vlastos 'One World' 355.

with the experiment.[28] Anaxagoras opens B4a with the claim that 'it is right to think' that everything that is combined or compacted contains many different things; here we must take him to mean that we *really ought* to suppose or hold this, given how things are. Then, with the 'it is right to think' phrase still governing what follows, he goes on to make claims about how things would be in another world; at this point we must now take 'it is right to think' as something like we must 'counterfactually suppose' (in Schofield's phrase). But there is no indication that the single instance of 'it is right to think' has two such very different senses in the passage. This conclusion could be avoided by giving up the idea that Anaxagoras is talking about other worlds at all; perhaps Anaxagoras is merely saying that the initial conditions are such that the world as we see and know it is just the one that we should have expected to develop.[29] The problem with this modified account, as Schofield has pointed out, is that it undermines the force of the last sentence of B4a. Why would Anaxagoras say that separation would have happened not only here but also elsewhere (*alla kai allēi*) if the point of the passage is to stress that this world could not have been *otherwise*? Moreover, some critics have argued that this account underestimates the role of Mind, or *Nous*, in the separation; why is our world the only world that *Nous* could have produced?[30]

At this point we might be inclined to agree that the microscopic-worlds account, however fantastic it may seem, is the only alternative left to us. Schofield, a defender of the view, argues that only this view (a) makes sense of the text and (b) provides a coherent account of the role of *Nous* in world-making.[31] Following Mansfeld, Schofield argues that the keys to understanding B4a are Anaxagoras's stress on unlimited smallness throughout the cosmogonical fragments and the fact that separation operates throughout the mixture of all things. Schofield thus takes B6 as crucial for understanding B4a, According to his analysis, B6 argues that as the world is now, after separation from the original mix had proceeded, there is everything in everything no matter how large or small (where 'small' and 'large' refer to size rather than degree of emergence or submergence in the background mix).[32] If there is everything in everything and if size is not a measure of complexity, then there is nothing to prevent there being worlds just as

28 For detailed and technical philological criticisms of Fränkel's proposal, see Vlastos ('Innumerable'), Mansfeld ('Other World'), Schofield ('Revisited'), and Louguet.

29 This suggestion is made by Furley in a brief discussion of B4a ('Response' 56 and also n. 37). It is expanded and criticized by Schofield ('Revisited' 11–13).

30 Schofield ('Revisited' 13).

31 The argument appears in Schofield ('Revisited' 13–18).

32 On this, see Essay 3.

complex as our own at the microscopic level (microscopic compared to us). Anaxagoras signals this at the opening of B4a (a fragment that Simplicius says comes fairly near the beginning of the book, where B1 stresses the unlimited smallness of all things in the original mixture) by saying, 'Since these things are so, it is right to think that there are many different things present in everything that is being combined.' If we then take 'in everything that is being combined' as governing the rest of the claim, the point is then made that separation operates at all levels (it is not, as Schofield puts it, merely 'skin-deep'):

> Anaxagoras is best understood as encouraging us to believe that at that microscopic level there is or might be a duplicate of the world-system we are familiar with at the macroscopic level ... If you could penetrate below the level of the perceptible, you would find that separation has operated and is operating there too, in just the same way and to just the same effect as 'with us.' Suggesting that our entire differentiated world system is replicated at the micro-level is a dramatic and unexpected way of making that point, designed to get the reader to sit up and take notice.[33]

Although this interpretation has a certain attraction, there are reasons for doubting that it is correct. One immediate objection is that, despite the dramatic way of making the point about separation operating at all levels, apparently no reader in the ancient world sat up and took notice. We might have expected such a startling theory to have attracted some attention and gained some mention in the doxographers, but this seems not to have happened. Schofield acknowledges the difficulty, admitting that the microscopic-worlds reading 'is not explicitly legitimated by anything said in Fr. 4a,' and that the reading depends on assuming that before the beginning of B4a Anaxagoras had already discussed the complexity of the small (and that small and large have the meaning that Mansfeld and Schofield need for the point to go through).[34] This is a questionable

33 Schofield 'Revisited' 15.

34 Ibid. 18. Schofield notes that Simplicius refers to a passage where Theophrastus contrasts Anaximander and Anaxagoras by saying that for Anaxagoras mind produces 'the worlds' (6–7 with n. 26; the Simplicius passage is at *in Phys.* 27.15–17 – but see the comments by Guthrie at *History* 2:313 n. 1). This is the only mention of plural worlds associated with Anaxagoras and it is not followed by any other doxographers. Schofield suggests that Theophrastus's wording might be a result of 'his allegiance to the Mansfeld interpretation' of B4a (n. 26). But this is not conclusive. In note 55 (p. 17), Schofield points out that the microscopic-worlds interpretation of B4a is (a) inconsistent with the interpretations of 'small' and 'large' offered by Inwood and Furth (a version of which

assumption; we have no evidence that there was more discussion of the small before B4a; the complete lack of ancient evidence for the microscopic view makes it less likely that this is what Anaxagoras meant in B4a.

There are other problems. Although the supporters of the interpretation might be right in reading 'in everything that is being combined' as governing the rest of the fragment, it is not the most natural reading, nor is it forced on us by the text. Moreover, a microscopic-worlds account sits rather uneasily with Anaxagoras's words at the end of the passage: 'elsewhere' is not the most natural way to refer to entire smaller worlds inside single macroscopic objects.[35] Moreover, as Louguet argues, although Anaxagoras insists at the end of the passage that the separation would take place elsewhere as well as for us, the middle parts of the passage are not exclusively concerned with things that are separated off from the mixture. Rather, the focus is on human beings, their activities, and the works that they produce. People, plants, and animals ('as many as have soul') are compounded or compacted things, or mixtures as B17 has it, but B4a also mentions farming, households, and manufactured items, all the result of human activities. Louguet notes that it is difficult to understand how these artefacts (both natural and the more familiar sort) and activities are supposed to be included in the things and seeds of the first sentence of the fragment, as they must be on the Mansfeld-Schofield microscopic-worlds thesis; human-made artefacts are never mentioned as things that are part of the mixture or compacted simply by the separation of the basic things.[36] This makes it improbable that the passage has the structure required by the microscopic-worlds view. It seems that we must look for a different interpretation of Anaxagoras's claim that 'there would have been separation not only for us but also elsewhere.'

The microscopic-worlds view gained support from two considerations. The first is the doxographers' claim that Anaxagoras belongs in the group of early Greek thinkers who thought that there was a single universe. The evidence against multiple universes is not overwhelming, but there is

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we have adopted) and (b) consistent with Sorabji's infinitesimal-powder interpretation of the state of basic things in the original mix (which we rejected in Essay 2). While Schofield sees (a) and (b) as reasons for accepting the microscopic-worlds view, they can just as easily offer reasons for rejecting it.

35 This point is made by Sider (101) and by Louguet, who also points out that if 'elsewhere' is to be taken as a reference to levels, there is no reason to think that the other worlds are only microscopic; B3 says that there is no limit on the large, so our world could be contained within others that are much larger. There is no ancient evidence for this view either.

36 Louguet 509.

enough that we should perhaps hesitate before attributing the view to Anaxagoras.[37] The second is an apparent incongruity between the operation of *Nous* in forming the cosmos and the similarity of the other worlds to our own. If *Nous* is indeed the master mind of the cosmos, why does it make multiple universes that are all alike?[38] I suggest another interpretation of B4a that will, I think, answer these questions.

We begin by recalling what Anaxagoras says in B12 about the initial formation of the cosmos from the materials of the original mixture:

> *Nous* knew (*egnō*) them all: the things that are being mixed together, the things that are being separated off, and the things that are being dissociated. And whatever sorts of things were going to be, indeed whatever sorts were and now are not, and as many as are now and whatever will be, all these *Nous* set in order. And *Nous* also ordered this revolution, in which the things being separated off now revolve, the stars and the sun and the moon and the air and the aether. This revolution caused them to separate off.

There are two sets of claims here. One deals with the revolution and the separation that is the result of the revolution. The other concerns *Nous*'s knowledge and role in controlling the revolution. The link between the two is that *Nous* has knowledge of the things that are in the original mix and so knows what will emerge in the separation. The revolution begins in a small region of the mixture of everything in everything and spreads; as it expands through the indefinite expanse of mixed ingredients, it continues to enlarge the area of separation. As the vortex expands more and more of the mix is pulled into the whirl. If we think of the revolving mass as being like a whirlpool in a body of water, we can imagine that as the central area rotates, moving large masses of material, sub-whirls and eddies can form along the edges of the main rotation, perhaps because of the different densities of materials in the different areas of the mass. Each of these will itself rotate under the impetus of the original rotation, and the material

37 Aristotle does not say that Anaxagoras has only one universe, but he does not ever discuss him along with those who adopt the multiple-universe view. There might be support in Anaxagoras if B8 is taken as having a cosmic reference.

38 As Schofield puts it, 'In Anaxagoras' theory creation of a universe requires the activity of mind. Why should his divine mind *want* to create several contemporaneous universes that are all the *same*? For that separation produces the same results elsewhere as it does with us is what Fr. 4a insists. Given a divine mind at work, one would expect either one world only, the best of all possible worlds, or different worlds, achieving the goal of optimal variety. A mind which has no wish or option but to replicate the same product simultaneously over and over again forfeits its claim to *be* a mind' ('Revisited' 8, see also the comments on 17; italics in original).

caught up in these will behave just as the ingredients in the main mass do: the heavier will move to the centre of the local whirl and the lighter move out to the edges.[39] The cosmological descriptions of the whole will apply to these regions, since they are in the whole as well. The key is to remember that for Anaxagoras the edge of the whirl does not mark the edge of what there is, because the extent and expanse of the original mix is, as B1 says, indefinite. As the separation occurs, with the same ingredients behaving in the same way the same sort of world will develop, with sun and moon, an earth growing things, living things being compacted, and human beings settling cities and fabricating things. As B4a says, separation will take place not only for us but also elsewhere, and those other separations follow the pattern, and things are for them just as they are with us. This is not a theory of multiple universes: there is but a single universe (the whole of what there is), but within it there may be different world-systems that develop (as there can be different galaxies within our universe and different solar systems within a galaxy).[40] So, the doxographic tradition that claims a single universe for Anaxagoras can be maintained.

Here is an objection to this view: What of the statements in B12 that *Nous* knew and arranged everything? These assertions suggest that *Nous* is an intelligent and creative force for whom making multiple similar worlds would apparently be a supremely pointless activity.[41] This objection understands the universe as a direct consequence of *Nous*'s creative activity, but it is not based solely on a desire that Anaxagoras's *Nous* have a genuinely teleological function. Rather, the objection envisions *Nous* as an *artist*, whose activity must be unique, rather than as a mindless machine

39 Think of standing on a bridge over a millrace watching the water emerge from under the bridge: a large whirl forms in the water where it emerges. If the force is strong enough, there will be a large central whirl with several offshoots, each with sticks, leaves, and other material caught in it and each forming its own arrangement that mirrors that of the debris moving in the central whirl. Another example: smaller storms and tornadoes are often spawned within a large weather mass (a Force 4 or 5 hurricane, for instance).

40 Neither Mansfeld ('Other World' 3) nor Schofield ('Revisited' p. 17) finds the notion of many micro-worlds within a single macrocosm inconsistent with the reports that Anaxagoras maintains that there is but a single world. Mansfeld says that we may 'assume, reasonably, that "cosmos" pertains, not to a world-system composed of earth and heavenly bodies etc., but to an ordered *universe*. Within such a universe, there is room for a plurality of world-systems: the one we live in, others beyond our possibilities of perception' ('Other World' 3; italics in original). Mansfeld thinks the other world-systems are microscopically contained within ours; I maintain that they are in other areas of the main whirl. In either case, the other world-systems are 'beyond our possibilities of perception,' in the one case because of microscopic size, in the other because of being beyond the boundaries of our world-system.

41 Schofield has argued this way; see above, n38.

(as Aristotle says in *Metaphysics* A.4 985a18–20). The world could be quite different from the way it actually is had *Nous* chosen to arrange things differently; thus, the structure and furniture of the world is primarily a function of *Nous*'s actions. To be a genuine creator, *Nous* must not produce numberless identical versions of the same thing.

This objection misses something essential in Anaxagoras's theory. In suggesting that things are as they are because *Nous* makes them that way, it underestimates the role of the things themselves.[42] The things and seeds in the original mix are genuinely real entities and, along with *Nous*, are the metaphysically basic things of Anaxagoras's theory. Each has a nature or character of its own, independent of *Nous* (even though *Nous* has knowledge of them). It is true that *Nous* sets the revolution in motion, but it is the strength and velocity in the revolving mass that causes the separation off and subsequent mixture of the ingredients and development of the seeds in the original mix. Thus, although *Nous* is the first motive cause of the universe (which develops through the rotation of the mass of ingredients), it is the mechanical processes of separation and mixture that are the *proximate* causes of the natural artefacts (humans, animals, plants) figuring in the activities in B4a. As B12 puts it, 'the revolution itself made the separation off.' The claim in B12 that *Nous* 'set everything in order' does not mean that *Nous* created the world as it is for a particular reason; rather, *Nous* can reasonably be said to have arranged or ordered things because it set the rotation going and understands how things will combine (given the ingredients in the mix).[43] Nevertheless, because of their own natures, the ingredients in the original mix will behave in characteristic ways in any separation. Thus, the other worlds will be similar (although not necessarily identical) to ours, but this will not be primarily because *Nous* decided or willed that they must be so.

A second objection may also be raised. According to B15, the process of separation moves 'the dense and the wet and the cold and the dark ... here, where <the> earth is now; but the rare and the hot and the dry <and the bright> moved out to the far reaches of the aether.' This, it could be argued, implies that there is a single world system in the universe, with (our) home Earth in the middle (following what the testimonia say about the place of the Earth). While the argument has some force, it is not

42 For a clear and elegant discussion of this issue, see Louguet, especially her section IV, 'Pour une désacralisation de l'intellect.'

43 Simplicius' comments in A41 and in the context of B13 suggest he took Mind's primary role to be to put the mass into rotation; it is the rotation that brings about the separations that result in the ordered universe.

compelling. First, there is the matter of the text itself.[44] While Sider has shown that 'earth' (*gē*) is in every manuscript of Simplicius, the definite article appears in only two.[45] Anaxagoras's mention of the earth may not imply that our Earth is the sole place where the heavy and dense material collect in quantity. Given that the stars and moon are themselves earthy and that the everything-in-everything principle holds throughout the whole range of what is, there will be earthy stuff and other heavy and dense stuff throughout the universe. Thus, it could well be that this is not the only place in the universe where a preponderance of heavy and dense materials collects, as long as the appropriate mechanisms operate. Second, B15 can apply universally. That is, it could explain what happens in any whirl; if secondary or subsidiary whirls develop in the rotating mass of the original mixture, the heavy and dense materials, as well as the light and bright ones, will behave in the same way, with a predominance of heavy materials forming an 'earth' at the local centre and the ethereal materials heading out to the far reaches of the whirl. Given the force of the fundamental principle of everything in everything (including seeds of all kinds), the materials so distributed will behave as they do 'with us'; sun and moon will form, humans and animals (as many as have soul) will be compacted, and the earth will grow many things that the inhabitants (who develop households and make works) treat as we do.[46] So, things will be for them as they are for us.

A final comment. Supporters of the micro-worlds interpretation claim that it fits more closely with the text of B4a than an interpretation that places other world systems elsewhere in the universe. The text moves directly from the assertion that 'it is right to think that there are many different things present in everything that is being combined, and seeds of all things, having all sorts of forms, colours, and flavours, that humans and also the other animals were compounded, as many as have soul' to the claim that there are cities and households settled and made by human beings elsewhere and that things are for them just as they are for us. On the microscopic-worlds account, the connection between the two claims is that the cities and households are themselves included in the 'many different things present in everything that is being combined.' While this interpretation offers a way to connect what seem to be rather disjointed claims by Anaxagoras, as we have seen, it has difficulty with the end of the

44 A fuller discussion is in the notes on the text.

45 Interestingly, Sider omits 'the' (*hē*) in his Greek text, but translates 'the earth' (this is allowed but not forced by the Greek).

46 Note that the text of B4b says explicitly that *the* earth (*hē gē*) will grow things for them (*autoisi*).

fragment, where Anaxagoras says that there would be separation 'not only for us but also elsewhere,' as 'elsewhere' is, perhaps, not the most natural way to speak of microscopic worlds inside the mixtures with which we are familiar. The interpretation that I advocate has no trouble with the claim about 'elsewhere'; moreover, it can also make sense of the opening of the fragment. The passage begins with a phrase ('since these things are so, it is right to think . . . ') whose reference is unclear, but from what follows and from the end of the fragment ('I have said this about the separation, because there would have been separation not only for us but also elsewhere'), it is reasonable to suppose that what had preceded were claims about universal mixture and separation (as in B1 and B2).[47] What the fragment says is that given both universal mixture and separation, the things that are combined will contain everything (because separation brings about re-mixture in the plenum of ingredients). Moreover, because both the ingredients and the process of separation occur throughout the universe, there will be similar results wherever separation occurs. Thus, humans and whatever else has soul can appear in local separations throughout the universe, and go about their business just as they do here on the Earth that we know. So, although there is only one universe (the scope of the rotation continuously spreading through the original mixture of ingredients), within that universe numbers of world-systems like our own can develop.

5.3 Natural Phenomena above, on, and in the Earth

The revolution that *Nous* sets going forms the cosmic bodies: Earth, sun, stars, and planets. At the sublunary level, Anaxagoras gives naturalistic and mechanistic explanations of meteorological phenomena, and of natural features and events such as rivers and earthquakes. *Nous* recedes in importance as a direct cause, although, in a secondary sense, it remains responsible for everything else that occurs. The evidence for Anaxagoras's accounts of these phenomena is scanty and, aside from B19 (which itself is a contested fragment), we have to rely on the doxography in order to piece together his views. In addition to his accounts of the celestial phenomena that were discussed in section 5.1, there are doxographical reports of explanations of weather, the formation of the sea and rivers, and earthquakes.

47 Simplicius says that B1, B2, B3, and B4a all occur at or near the beginning of Anaxagoras's book. B3 does not directly discuss the mixture of all in all or separation, but it is concerned with the unlimited smallness and largeness necessary for the principle of universal mixture to hold. Moreover, in the context of B3, Simplicius himself explains the fragment by the example of separation. (On the extent of B3, see the commentary.) One might also read B4b before B4a; this makes the transition quite smooth.

The one surviving fragment that deals with these questions is B19, in which Anaxagoras explains the rainbow: 'We call the reflection of the sun in the clouds the rainbow.' Sider points out that Anaxagoras correctly reports 'the fact that rainbows are always seen with the sun directly at one's back.'[48] A86 is a report from Aëtius that is based on this fragment, and notes that this explanation (or something similar) also holds for the so-called mock suns that are said to occur near the Black Sea.[49] As for clouds, Aëtius also reports (A85) that Anaxagoras's account is similar to Anaximenes' claim that cloud is air that is more condensed than the winds (which are also condensed air). Despite following Anaximenes in his explanations of both cloud and snow, which is air yet more condensed, Anaxagoras gave a different account of hail, one that, according to Aristotle, explained why there are more hailstorms during summer and in hot places (see A85). The heat from the Earth pushes the clouds upwards into upper reaches of the sky, which are colder. The water in the clouds freezes and falls to Earth as hail; Aëtius says that the falling water takes on a round shape as it carried down.[50] This occurs more often in hot places because the more extreme heat from the Earth in such places pushes the clouds that form over them higher up into the colder sky. According to Diogenes Laertius and Hippolytus, Anaxagoras said that winds are formed when air is rarified by the sun (A1.9, A42.11). Heated air, even if it is not yet rarified enough to become wind, is apparently quite noisy: in A74 Plutarch says that air heated by the sun is stirred up and quivers (one can see evidence of this in the motes of dust that are visible in sunlight); this heated air hisses 'and makes a racket during the day.' Plutarch and Pseudo-Aristotle both say that the hissing quiets down at night, thus making 'the night a better time for hearing' (as Pseudo-Aristotle says). Warm clouds rising into the cooler reaches of the sky cause hail, but hot aether entering the cooler regions from above causes thunder and lightning (there are reports on this in A84 from Aristotle, Aëtius, and Seneca). According to Aristotle, the gleam of the fire entering from above is the lightning. Aëtius adds that

48 Sider 161. On the problems with the text and extent of the quotation in B19, see the notes.

49 'Mock suns,' or parhelia, are bright spots appearing in the sky near the sun; they often appear in pairs, one on either side of the sun. Aristotle discusses them (and other phenomena caused by reflection, including the rainbow) in *Meteorology* 3.

50 All these reports are in A85. Alexander of Aphrodisias says that Aristotle has Anaxagoras in mind in his account (in the *Meteorology*). One might wonder why the upper reaches of the sky are colder (since the hot and dry stuffs are carried upwards), but Aristotle says that the rays of the sun reflected off the Earth do not reach that high and so the upper reaches of the area around the Earth are cooler than the lower part. Presumably the very hot parts of the cosmos are yet higher (above the stars).

lightning results from the contrast of the bright fire with dark cloud; as the fire enters the cooler regions it is quenched, and the resultant noise is the thunder.[51]

Many of these explanations rely on the motion of air (either up or down), or the forcing of fire down from the upper reaches of the aether into the sky above the Earth. It is reasonable to think that this motion is ultimately related to the original revolution of the whirl that produces the cosmos in the first place. As we have seen, it is this whirling motion that snatches up rocks from the Earth and turns them into the rotating bodies (both seen and unseen) above and below the Earth. The rotation also occurs under the Earth, and it is this movement around the Earth that is apparently one of the causes of earthquakes. Aristotle gives one account of Anaxagoras's explanation of earthquakes (in A89; apparently followed by Hippolytus in A42.12), while Diogenes Laertius (A1.9) and Aëtius (A89) seem to give another. Yet a third appears in Seneca (also A89). According to Aristotle, aether, as it moves upwards, is trapped in hollows under the Earth and thus shakes the Earth. Hippolytus gives a similar account, but in terms of air rather than aether: the air above the Earth 'falls below it'; this causes the Earth (which rests on air) to shake. Both Diogenes Laertius (in one clause) and Aëtius attribute the shaking to air, but to air that sinks into or slips under the surface of the Earth, becomes trapped, and then shakes the Earth. Seneca adopts the moving air in the lower-regions account, but adds that fire is also involved, probably because of the force of the air as it pushes its way out of the Earth. Perhaps Seneca is relying on whatever it was in Anaxagoras that led Aristotle to put *his* summary in terms of aether, which he says is Anaxagoras's word for fire, rather than air. As others have noticed, if Seneca has the correct account (or something near it), Anaxagoras might then have observed a connection between seismic and volcanic activity.[52]

Aristotle specifically says that earthquakes occur even though the Earth is porous (and so, presumably, the rising aether could pass right through) because the top surfaces are clogged by rain. Presumably, other sources of water block the pores as well, or at least limit the number of them that remain open to allow for the rising aether or air to escape. Those

51 Hippolytus agrees with this account (A42.11), but in the one sentence that Diogenes Laertius gives to the matter (A1.9), he seems to offer a different account ('thunder is the clashing of clouds, lightning, the friction of clouds.') This comment is so brief that it is impossible to tell whether it is meant to summarize Aristotle's view. Aëtius (in A84) expands Anaxagoras's explanation of thunder and lightning to cover thunderbolts, typhoons, and the *prēstēr* (which is, apparently, a fiery waterspout.)

52 A discussion of the issue can be found in Guthrie 2:310–11.

waters are the sea and rivers. Diogenes Laertius reports that the sea is water that was originally spread over the Earth (he is simply saying where the sea is: between the Earth and the air). Hippolytus says that the sea was formed from water within the Earth as well as from the rivers (which are formed both from rain and from water already in the Earth's porous parts) that flow into it. Like other Presocratics, Anaxagoras tried to explain the saltiness of the sea, and seemed to attribute it both to the percolation of the water through the Earth before it becomes part of the sea, and to evaporation. In his commentary on Aristotle's *Meteorology*, Alexander of Aphrodisias says the brackish character of the sea is due to the water's picking up flavours as it seeps through the Earth (offering the mining of salt and carbonate of soda from the Earth and sour-tasting earth in certain localities as evidence). Aëtius says the original water was brackish; it was then burned and evaporated by the sun, which intensified the saltiness. (Neither Alexander nor Aëtius explains on Anaxagoras's behalf why most well-water is sweet but some is salty.) Hippolytus, too, opts for evaporation as the correct account. In Galen's commentary on Hippocrates (A90), Anaxagoras is said to claim that heat (which brings about evaporation) is the cause, but adds that the degree of heat affects the flavour.[53] The water in the Earth, together with rain, forms rivers, though the Nile is given a special explanation: its seasonal flooding comes from melting snows in southern regions.[54] Herodotus describes Anaxagoras's account as 'the most persuasive of all, but the most false' (A91).

5.4 Living Things: Embryology and Perception

In B4a, Anaxagoras says that 'human beings ... are compounded and the other living things, as many as have soul.' Anaxagoras thus adopts the traditional view that to be a living thing is to have soul. In B12 he says that *Nous* has control over 'everything that has soul, both the larger and the smaller.' Although *Nous* has control over everything, Anaxagoras particularly marks out living things as being controlled by *Nous*. This, when combined with B11 ('in everything there is a share of everything except *Nous*, but there are some things in which *Nous*, too, is present') suggests that every living thing has some share of the activities of *Nous*.[55] Although Anaxagoras does not make this explicit, these activities would seem to

53 See Pormann's note on the Arabic text of A90, p. 118n43 above.

54 For testimonia dealing with the Nile, see A42.5 and A91.

55 See also A101, which, despite textual difficulties, seems to say that all living things have some degree of *Nous*.

include some sort of awareness, either through perceiving or knowing, or both. The pseudo-Aristotelian treatise *On Plants* claims that Anaxagoras held that plants have sensation and emotions, as well as intellect and intelligence (A117), and these claims may well have been based on Anaxagoras's assertions about the presence of *Nous* in all living things.

As we have seen, for Anaxagoras living things are what I have called natural artefacts; they are mixtures (B17) or compounds (B4a) of the ingredients in the original mix. The question of their structure was raised in Essays 2 and 3, and in those essays I suggested that the connection between *Nous* and soul could help explain how the mixture of ingredients could result in the complicated living beings (plant, animal, and human) that populate the world we live in. I surmised that seeds are the key notion, being somehow the mechanism through which *Nous* is projected into living things and by which structure is imposed. The seeds are part of the original mixture and, in the proper conditions, develop into these beings. So Anaxagoras's embryology should be a fundamental part of his explanation of why the cosmos is the way it is; unfortunately, the evidence, always sparse, is particularly scanty on this issue.

Both Diogenes Laertius (A1.9) and Hippolytus (A42.12) report that animals first came to be from the moist (Diogenes Laertius adds the hot and the earthy), but later from one another. The seeds of those first animals were presumably either in the material that originally formed the Earth or were washed down with rain, as both Theophrastus (speaking of plants) and Irenaeus (who says this is true of both plant and animal seeds) report.[56] No reason why animals now come (only?) from one another is given; it might be that another animal of the same species provides the best (i.e., most efficient) medium for the germination of the seed and the subsequent nourishment of the growing embryo.[57] The development of a living thing from seed is not a matter of a seed in the appropriate medium expanding; reports of Anaxagoras's explanations of sexual differentiation

56 Theophrastus, A117; Irenaeus, A113. From what Theophrastus says, he takes Anaxagoras to claim that plant seeds are continually washed down with the rain. If seeds are part of the original mix, then the everything-in-everything principle would apply to them and so they would indeed be present in rain (and everything else). Like animal seeds, plant seeds would need to be in an appropriate medium in order to germinate.

57 As B22 demonstrates with respect to bird's eggs, seeds contain the original material necessary for the nourishment and growth of the embryo. Whether nourishment can be taken in by the developing embryo or it must rely completely on the resources of the seed will depend on the type of living thing that is developing (bird's eggs presumably must contain everything necessary; mammal fetuses gain nourishment directly from the mother).

and heredity suggest that this picture is incorrect.[58] Aristotle lists Anaxagoras with those according to whom the sex of an embryo is already determined in the sperm from the father (*GA* 4.1 763b30); he says that on this view males come from semen from the right testicle, while females come from the left; males are then lodged in the right part of the uterus and females in the left.[59] Other doxographers report the right/left differences, but seem to think that sex is as much determined by placement in the uterus as by the location of the source of the sperm. Hippolytus attributes to Anaxagoras the view that 'males are produced whenever sperm comes from the right side of the testicles and is fastened on the right side of the mother's uterus; females in the opposite case' (A42.12). Aëtius (A111) says that for Anaxagoras and Parmenides males are produced when 'sperm from the right side is deposited into the mother's right side, that from the left into the left. But if the discharges are changed around, females are produced.' Diogenes Laertius simply says that 'males come from the right, females from the left.' Finally, Censorinus gives us several snippets of information: Anaxagoras thinks semen comes from all parts of the body, and from both the father and the mother; like Empedocles, Anaxagoras claims that males come from semen from the left, females from the right, but Anaxagoras thinks that offspring resemble the parent who contributes the most seed.[60] As these reports conflict, they cannot all be correct. If we discount Aristotle's claim that Anaxagoras says that sex is already completely determined by seed from the father (which is inconsistent with all the other reports),[61] then we are left with claims that indicate that the sex and characteristics of the offspring are not determined until the sperm (which may come from both parents) is deposited in the uterus.[62] In that case, seeds in the original mix would be distinguished by kind. They then become the sources of particular individuals, having a specific

58 There are conflicting accounts in the doxography. For an analysis of the doxographical reports, see Kember.

59 In the Loeb edition of the *GA*, Peck states that the claims about the right and left parts of the uterus 'must be an interpolation, as they are inconsistent with the view just described' (373), which is that sex is already determined in the sperm, with the female providing only the place for the developing fetus. If placement in the uterus helps to determine the sex of the offspring, then there is indeed an inconsistency; if male sperm naturally go to the right and female to the left, there may not be.

60 See A107 and 111.

61 See Kember for reasons for discounting this text, including references to a Latin translation of an Arabic text of the GA that does not mention Anaxagoras in this passage.

62 There is some evidence that the mixture of sperm from the two parents is called a 'panspermia,' a term that causes difficulties in other parts of interpretations of Anaxagoras (see Essay 1).

set of characteristics, only when they are developing *in utero*, instead of being (very) small particular individuals that expand but do not actually develop in the prenatal stage. These seeds would have the material that any animal of that kind would need for early development, and (perhaps) would include a structural plan (provided by *Nous* and soul). This account, if it is Anaxagoras's (or close to his account), is consistent with the view that living things are natural artefacts or mixtures, a view supported, as we have seen, by the fragments themselves.

Thanks to the survival of the part of Theophrastus's *De Sensibus* that deals with Anaxagoras (see A92), we have fairly good evidence for some of his theory of perception. The fundamental claim is that perception is through unlikes, for as Theophrastus puts it, 'the similar is unaffected by the similar.'[63] According to Theophrastus, Anaxagoras attempted a systematic explanation of each sense using the principle of 'perception through unlikes,' and although Theophrastus gives Anaxagoras some lukewarm approbation for attempting to explain each sense, he ultimately judges that Anaxagoras's account of perception is old-fashioned and that Anaxagoras is not clear on the tactile senses (he adds in section 59 that Anaxagoras's account of colour is superficial). Other than saying that sight comes through a reflection in the eye and that sound enters the brain by penetrating the hollow bone that surrounds it, Theophrastus' evidence suggests that Anaxagoras did not give much attention to the mechanics of perception. A second principle at work in the theory is that perception is proportional to the size of the animal and the sense organ. Large animals see and hear large and distant things; the opposite holds for small animals.[64]

Perhaps most striking is Anaxagoras's claim, reported by both Aristotle and Theophrastus, that all perception is accompanied by pain (or discomfort).[65] This follows from the principle of 'perception through unlikes.' As evidence, Theophrastus offers the phenomena of touch and taste: what is the same temperature as our flesh does not register, only what is hotter or colder; we perceive the sweet by the bitter, and so on. Moreover, prolonged

63 *De Sensibus* 1 marks out only Heraclitus and Anaxagoras as holding that perception is via the dissimilar (rather than the similar). For other discussions of Anaxagoras's theory of perception, see Beare, Stratton, and Baltussen.

64 Although we may have some idea of what it is to see a large and distant thing (but would it appear large over a distance?), it is not clear what it is to hear a 'large and distant thing.' There seems to be more to it than the notion that a large animal (with large ears) is better at hearing things that are farther away than smaller animals. According to Theophrastus, Anaxagoras also claimed that small animals see and hear small and near things (A92.29 and 30). Why cannot small animals hear large near things and large ones small distant things?

65 Theophrastus in A92, Aristotle in A94 (*EN* 1154b7); see also Aëtius and Aspasius in A94.

or excessive perception (staring for a long time at a light or being exposed to very loud noises) is painful. Presumably extrapolating from such cases, Anaxagoras concluded that in all cases of perception, the contrast between the state of the perceiving organ and the opposite or dissimilar that is perceived would be felt as a change from the normal state and thus as discomfort in some degree, greater or lesser in the various cases.[66]

5.5 Science and Metaphysics

Anaxagoras does not explain how (or if) perception leads to knowledge. There are few testimonia that deal with epistemological issues, and Anaxagoras's failure (or disinclination) to say anything about the intellectual operations of *Nous* and soul add to the difficulty of determining his view. Nonetheless, there are two short fragments (both preserved by Sextus Empiricus) dealing with perception and knowledge that are important for understanding how Anaxagoras saw the problem of connecting metaphysics with physics and thus providing for genuine scientific knowledge of the perceived world. Anaxagoras attempts to provide detailed explanations of natural phenomena that are both metaphysically and epistemologically sound. Recall that finding a way to justify scientific claims (finding a rational cosmology) was a fundamental problem that Anaxagoras inherited from Parmenides. Anaxagoras works within the Eleatic strictures by beginning with the genuinely real ingredients in the original mixture and rejecting any genuine coming-to-be and passing-away. The mechanical processes of separation and mixture that follow from the revolution of the original mass of ingredients (overseen by *Nous*) yield the cosmos (with its possible many worlds), without a theoretical resort to the reality of either coming-to-be or passing-away. So, if the metaphysical picture presented in B1, B3, B12, and other fragments is correct, Anaxagoras will have given a metaphysically respectable account of the physics of the world of the senses; in short, he will have produced the desired rational cosmology. But the question remains: can Anaxagoras know that his account is both metaphysically correct and an accurate account of the ways of the cosmos? Has he successfully forged the required link between science and metaphysics?

66 Part of the difficulty is in knowing just what Aristotle and Theophrastus mean by the Greek word *lupē*. Do they mean active pain, slight discomfort, or simply some deviation from what is neutral? Further, is their report an accurate account of what Anaxagoras actually said or an interpretation of something he says as evidence for the 'perception through unlikes' thesis?

The two fragments may seem, on first glance, to offer conflicting evidence on the value of the senses for determining how things really are:

B21: Owing to their [the senses'] feebleness, we are not able to determine the truth.
B21a: ... appearances are a sight of the unseen.

Sextus quotes B21 in the context of arguing that the early thinkers adopted reason (*logos*) rather than perception as the judge of truth. In support he says that Anaxagoras 'overthrew' or disparaged the senses. Sextus goes on to give us the evidence: 'he proposes as assurance of their untrustworthiness the gradual change of colours. For should we take two colours, black and white, and slowly pour one into the other drop by drop, sight would not be able to distinguish the slight changes, although in nature they are real.' Here Sextus seems to indicate that Anaxagoras rejected perception as the route to true judgment about the way things really are. At first glance, this is hardly surprising. The world reported by the senses apparently consists of discrete physical objects that both come to be and pass away, and undergo physical alteration. On the other hand, according to the metaphysical fragments, the universe is a mixture of all the things there are, with everything in everything. Neither coming-to-be nor passing-away is real; rather there are mixture and dissociation of what is mixed. What look like basic parts of the world – the plants and animals, the large masses of earth, air, and water, the stars and planets – are merely what I have termed natural artefacts, temporary emergents from the background mixture through those processes of mixture and separation. Fragment B1 both describes the truth about reality in the original state and makes clear the inability of the senses to apprehend that state: 'All things were together, unlimited both in amount and in smallness, for the small, too, was unlimited. And because all things were together, nothing was evident on account of smallness.'[67] Moreover, in B11 and B12, Anaxagoras stresses the mixture in each thing, concluding that 'there are many shares of many things; nothing is completely separated off or dissociated one from the other except *Nous*. All *Nous* is alike, both the greater and the smaller. Nothing else is like anything else, but each one is and was most manifestly those things of which there are the most in it.' What gives a perceptual object its character is the predominance of certain ingredients in it. Everything is in everything (as B6 and B11 say, and as B8 implies); nevertheless, as we have seen, the proportions or densities of the ingredients will differ in different places,

67 See also B4b: 'Before there was separation off, because all things were together, there was not even any colour evident; for the mixture of all things prevented it.'

and it is those ingredients that predominate in a certain region of the mix that give an object its character. If we combine B12 with Theophrastus's account of perception, then it is the opposites in the predominant ingredients that affect the senses most, and so, for example, produce the sensory awareness that there is a strong-smelling, stiff-haired, braying, black and white striped animal running in front of me that I call a zebra. That much the senses can tell me. But the senses are silent about the fact that the zebra that I perceive is not a metaphysically genuine entity, but merely a mixture of genuinely real ingredients in a certain set of proportions. That must be determined in some other way. This would seem to be rather far from Sextus's example of the imperceptible change as black is added to white (or vice versa), but in truth the two are examples of the same thing in different ways. Sextus's example shows that the senses cannot discriminate changes in the mixture that take place below a threshold determined by the acuity of each sense in each case.[68] Similarly, the senses cannot perceive the reality that everything is a mixture of everything: that there is black and hot in snow as well as cold and white, and that coming-to-be and passing-away are merely complicated cases of mixture and dissociation of mixtures (along with the concomitant re-mixture that occurs at each dissociation). We might, then, conclude that Anaxagoras should reject the senses as a path to knowledge. Yet, such a conclusion would be a mistake.

What B21 shows is that reliance on the senses *alone* leads to mistakes. The senses are 'feeble,' but they are not worthless. Their feebleness lies in their inability to perceive finely enough; they cannot see below the surface, as it were, to get to the reality that underlies and causes the perceptions that they can capture.[69] To suppose that the evidence of the senses is sufficient for knowledge is a mistake; nevertheless, the senses provide evidence that can and must be taken into account in determining how things really are. One aspect of a rational cosmology is that it attempts to provide a metaphysically acceptable account of the world reported by

68 Thus, as Theophrastus reports, different animals see and hear at different levels of acuity; my dog Kate hears things that I do not and sees movement better than I, but I more easily see stationary things that she must detect primarily by smell.

69 A similar evaluation of the senses occurs in Democritus at 68B11, also preserved in Sextus at 7.139, just before he quotes Anaxagoras B21a (Sextus adds that Democritus praised Anaxagoras for the saying in B21a). Democritus says that when the senses can no longer be useful because of the smallness of what is perceived, something 'finer' takes over. B11 is a disputed passage; I have argued for this interpretation in 'Skeptic.' See also C.C.W. Taylor, in his volume *The Atomists* in this series, and in his 'Anaxagoras and the Atomists.'

the senses. Another is that the account must be phenomenally acceptable as well. It must adequately explain what we experience; the content of that experience provides a check on the adequacy of the explanation. Any metaphysical theory that fails to harmonize at some point with our experience would be unacceptable as the basis of a rational cosmology, which is, after all, an attempt to link metaphysics and physics. So, in an important way, the contents of our experience are the starting point for a rational cosmology. The data of sense experience are the raw material to be explained. Because the sensible world is the metaphysical world as it appears to us, the fundamental connection is there, ready to be exploited and explained. Consider again Sextus's report of Anaxagoras's evidence for the untrustworthiness of the senses: 'if we should take two colours, black and white, and slowly pour one into the other drop by drop, sight would not be able to determine the slight changes.' In the context of Sextus's quotation of B21, it is striking that the senses *miss* the changes that occur with each additional drop. Nonetheless, it is equally important that we *can* work out that such minute changes must have occurred with each drop because at some point the change in the mixture becomes apparent. The colour change takes place and we are moved to ask why. As we begin to work through the problem we bring to bear evidence from two levels. The first is the rational Eleatic argument about the nature of what is real. The second is what we see happening. The pool of colour in front of us is a mixture, and it changes character as more of a particular ingredient is added; moreover, the addition of white to the black makes the mixture lighter as more white is added. Here in microcosm is the principle of mixture and predominance. Even though we do not perceive the consequences of each step in the process of mixture (because we do not perceive the change that each drop brings to the mix), what we sense gives us a clue to the workings of the whole cosmos. The apparent things, the phenomena, provide a glimpse of the unseen, the unapparent, just as Anaxagoras says in B21a. The testimonia give several such examples. The circular movements of the stars are a sign of the larger movement of the whirl of the original mix; the turnings of the sun and moon indicate the force of the air moving in the whirl, and the behaviour of air in a clepsydra is itself an indication that air is capable of exerting such force (A68, 69); the fact that the same foods nourish and allow growth in different sorts of living things is an indication of the everything-in-everything principle (A45 and 46). Thus, although *Nous* is indispensable to our understanding of the sensible world, the evidence of the senses is essential in telling us what needs to be explained, and can confirm certain aspects of the explanatory account. The explanation itself must be grounded in the comprehension of the natures

of the ingredients, the metaphysical principles, and the workings of the revolutions caused by *Nous*. Yet, as offering a sight of the unseen, the senses are a fundamental aspect of Anaxagoras' epistemology and science.

5.6 After Anaxagoras

Regarding dates, as Democritus himself says in the *Lesser World-Order*, he was young in the old age of Anaxagoras, being forty years younger than he. Democritus says that the *Lesser World-Order* was composed seven hundred and thirty years after the fall of Troy. (Diogenes Laertius 9.41)

Whatever we may think of the reports in Diogenes Laertius, this passage attests to the high regard in which Anaxagoras was held by later thinkers. Here is Democritus, who elsewhere is said to have had a grudge against Anaxagoras and to have accused him of plagiarism (see A5), dating himself and his work by reference to two important events: the conquest of Troy and the birth of Anaxagoras. The first of the Presocratics to work in Athens, friend of Pericles, successful scientist and philosopher, Anaxagoras was an important influence on Greek intellectuals. The reports in the testimonia point out how later sources found scientific agreements between Democritus and Anaxagoras, despite the differences in their basic theories. Even if Plato and Aristotle were disappointed by some of his views, both took Anaxagoras seriously. We have already explored the prodigious breadth of Anaxagoras's interests. We should also note the strong evidence that he relied on experience to provide evidence for his explanations. Moreover, his scientific theories were remarkably influential. Anaxagoras was the first to explain correctly eclipses and the formation of hail, and he was the first to discuss meteors and meteorites.[70] Once Anaxagoras had documented the existence of meteors, other philosopher-scientists followed in trying to explain them. (Perhaps this accounts for the association of Anaxagoras with the falling rock at Aegospotami.) Scholars have found evidence of the influence of Anaxagoras in Herodotus, Aeschylus, Sophocles, and Euripides (see A48, A62, A91, A112).

Plato's official rejection of Anaxagoras is well known: in both the *Apology* and the *Phaedo* Socrates is presented as taking some pains to distance himself from Anaxagoras's theories. Given that Anaxagoras and Socrates were both charged by the Athenians for impiety, Plato has reason enough

70 See Graham and Hintz; Empedocles, too, explains eclipses correctly. Both Anaxagoras and Empedocles were influenced by Parmenides' earlier assertion that the moon has no light of its own, but shines solely because of light reflected from the sun. Graham and Hintz argue that it is likely that Anaxagoras's view was earlier than Empedocles'.

to try to distinguish them. Indeed, in the *Phaedo* Anaxagoras's inability to provide an account of why things are for the best is credited with persuading Socrates to reject the study of physical science altogether. Nevertheless, not much later in the *Phaedo*, Socrates presents his own account of causation in terms that are redolent of Anaxagoras: the language of participation, the sharing of particulars in Forms, and the explanation that a particular has a certain property (tallness, say) because it has that character in it are strongly reminiscent of Anaxagoras's language in B6 and B12.[71] Plato differs from Anaxagoras in adding moral and evaluative notions (justice, beauty) to the list of basic ingredients, but he retains many of Anaxagoras's ingredients as well (the opposites, and, perhaps the natural stuffs such as fire and earth). While Plato rejects the literal presence of a character in a participant, it is notoriously difficult to understand his own position on what it is to have a share of a Form. In general, Anaxagoras's account of a world order driven and understood by *Nous* is a picture that Plato seems to have found both congenial and inspiring.

Like Plato, Aristotle thought that Anaxagoras's theories were ultimately unsuccessful, although, unlike Plato, Aristotle seems to have admired Anaxagoras's scientific work. Anaxagoras's theory of the eclipse serves as a model of good explanation in *Posterior Analytics* 2.8 (it is Anaxagoras's account, although Aristotle does not mention his name), and Aristotle's own meteorology builds on Anaxagoras's. As A58 shows, Aristotle considered Anaxagoras 'a sober man among the random chatterers who preceded him.' Aristotle's unmoved mover is in the Anaxagorean tradition, as is his commitment to the integration of natural philosophy and metaphysics.

71 A particularly Anaxagorean interpretation of Plato's view in the *Phaedo* is to be found in Denyer 'Stuffs.'

THE ANCIENT SOURCES FOR ANAXAGORAS

Because no complete texts of early Greek philosophical works have survived, we are dependent on the evidence of quotations, discussions by other philosophers or writers, and mentions of a thinker in later works, including scholia (marginal notes on manuscripts of works by other authors). These notes are meant only as brief identifications of the sources for Anaxagoras.[1] General discussions of the problems of evaluating sources for the Presocratics can be found in most collections of Presocratic texts (KRS, Barnes, McKirahan); fuller analyses (with references) can be found in articles and books by Mansfeld and Runia.[2] The translations in this volume generally follow the texts as found in DK; in the notes that follow there are references to the full texts of the more significant sources (more details can be found in the OCD). The Loeb Classical Library of Harvard University Press contains Greek or Latin texts and English translations of many of these authors. I have noted where a Loeb edition is available.

Achilles: Astronomer of the third century (?) AD, whose commentary on Aratus's astronomical poem *Phaenomena* (*Meteorology*) contains several references to Anaxagoras. Aratus (ca 315–240 BC), perhaps from Soli

1 Slightly more detailed accounts of many of these authors, along with references to texts, translations, and commentaries, can easily be found in the various editions of the *Oxford Classical Dictionary* (OCD).

2 Both Mansfeld and Runia have written general articles on the sources; in addition, they have collaborated on *Aëtiana*, a reconsideration of Diels's account of ancient sources (details can be found in the bibliography). Bibliographical information for those who wish to pursue further the problem of sources can be found in the books and articles referred to, as well as in the *Cambridge Companion to Early Greek Philosophy* and *The Oxford Handbook of Presocratic Philosophy*.

in Cilicia, studied with the Stoics. The text of Aratus is in E. Maas *Arati Phaenomena* (1898), that of Achilles in E. Maas *Commentariorium in Aratum Reliquiae* (1898).

Aelian: (Claudius Aelianus; ca 170–235 AD). Greek teacher of rhetoric in Rome; author of *Historical Miscellanies* (*Varia Historia*) as well as other works. The *Miscellanies* is a collection of tales and excerpts with an edifying intent. The most recent text of the *Varia Historia* is edited by M. Dilts (Teubner series, 1974); it is also available in a Loeb edition (ed. and trans. N.G. Wilson, 1997).

Aëtius: Compiler of an influential collection (probably dating to about the first century AD) of the opinions of earlier philosophers used extensively by later authors, especially Pseudo-Plutarch in his *Placita* and Stobaeus. Diels reconstructed Aëtius's work in his *Doxographi Graeci* and argued that the claims in Aëtius (though not the work itself, which is an epitome of earlier epitomes) could be traced back to Theophrastus. The existence of Aëtius is now generally (if not universally) accepted, although other parts of Diels's account have been refined and challenged.[3]

Alcidamas: Greek sophist and rhetorician (fourth century BC), follower of Gorgias, author of an extant work on the Sophists.

Alexander of Aphrodisias: Second to third century AD peripatetic philosopher and important commentator on Aristotle. His commentary on Aristotle's *Meteorology* is in the CAG (vol. 3, part 2); there is a text, with translation and commentary, of *On Fate* by R.W. Sharples (Duckworth 1983).

Ammianus Marcellinus: Fourth-century AD Roman historian. His native language was Greek (he was born in Antioch), but his *History* was written in Latin, and composed in Rome sometime after 378. There is a Loeb edition of the text, edited by J.C. Rolfe (1935–40; reprinted 1956–58).

Apollodorus: Learned author of (among others works) *Chronicles*, a poetic chronological history of the world from the fall of Troy. Apollodorus provides information about a number of Presocratic philosophers, assuming that each was forty years old at his acme or flourishing point. Apollodorus (born ca 180 BC) was an important source for Diogenes Laertius. The extant fragments of his work are collected in *Die Fragmente der griechischen Historiker*, edited by F. Jacoby.

3 Diels's reconstruction and account of the history of Aëtius's work (and modern objections to Diels's view) are fully explored and analysed in Mansfeld and Runia, *Aëtiana*, which is the introductory volume in a projected reworking of the Aëtius material.

Aristotle: (384–322 BC). Pupil of Plato and founder of the Lyceum. One of the greatest of philosophers, Aristotle is an irreplaceable source for our understanding of the early Greek thinkers. He discusses Anaxagoras and the other Presocratics throughout his works. The ancient commentators on Aristotle added to his accounts and included extensive quotations from those he discussed, thus preserving parts of their works for us. A number of works that were attributed to Aristotle in the ancient period are spurious, and their author is now indicated as Pseudo-Aristotle. English translations are available in J. Barnes, ed. *The Complete Works of Aristotle* (Bollingen series of Princeton University Press) and many of Aristotle's works are in the Loeb Classical Library.

Aspasius: Second-century AD peripatetic philosopher and commentator on Aristotle; only part of his commentary on the *Nicomachean Ethics* survives (it is included in the CAG, vol. 19, part 1, ed. by G. Heylbut 1889).

Athenaeus: Author of the *Deipnosophistae* (*Scholars at Dinner*), a large collection of excerpts and anecdotal stories presented as the dinner conversations of a group of learned men, published about 200 AD. It is available in a seven-volume Loeb edition with translation by C.B. Gulik, 1957–67.

Cedrenus: Byzantine author of an eleventh-century AD history of the world. (*Historiarum Compendium* ed. I. Bekker, 1839).

Censorinus: Roman grammarian of the third century AD, author of a compendium called *On Birthdays*, dedicated to Q. Caerellius on his birthday in 238. The most recent edition of the text of *De Die Natali* was edited by N. Sallman, Leipzig, 1983.

Marcus Tullius Cicero: Roman politician, orator, and philosopher (106–43 BC). The texts in which he mentions Anaxagoras, his *Academica*, *On the Nature of God*, *On the Orator* (*De Oratore*), and *Tusculan Disputations* are included in the Loeb editions of Cicero's works.

Clement of Alexandria: Greek Christian convert and apologist (born ca 150 AD). One of the early Church Fathers, Clement was the author of numerous works, including the *Stromateis* (*Miscellanies*), designed to demonstrate the superiority of Christian philosophy to that of the pagan Greeks. The texts are part of the series *Die griechischen christlichen Schriftsteller der ersten drei Jahrhunderte*, edited by O. Stählin (1905–36).

Cyril of Alexandria: (Died 444 AD) Christian bishop. Eager suppressor of heresies, paganism, and error; the text of his *Contra Julian* is in J.-P. Migne *Patrologiae Cursus, series Graeca*.

Diodorus Siculus (Diodorus of Sicily): Greek historian of the first century BC, author of an ambitious *History of the World*. Its many volumes are included in the Loeb series (ed. C.H. Oldfather et al.).

Diogenes Laertius: Author (third century AD?) of an important *Lives and Opinions of Famous Philosophers* in ten books. Diogenes gives anecdotal biographical histories and accounts of the views of the Greek philosophers from Thales to Epicurus, grouping them into schools. He uses numerous sources for his collection (for instance, the *Chronicles* of Apollodorus), sometimes giving more than one account of an author's views. Although the work is uncritical and sometimes unreliable, it is a valuable source of information. There are texts in a number of series, including Teubner (M. Marcovich, 1999–2002), OCT (H.S. Long, 1964), and Loeb (R.D. Hicks, 1965–66).

Eusebius: Greek Bishop of Caesarea (ca 260–340 AD), author of an ecclesiastical history, as well as *Praeparatio Evangelica* (*Preparation for the Gospel*) on coincidences between Greek and biblical teachings and attacking Greek philosophical views (a work that makes extensive use of Pseudo-Plutarch's *Placita*). His *Chronikon* (*Chronicles*) gives lists of important events and rulers from the birth of Abraham (assumed to have been 2016 BC) to the fourth century AD. Texts may be found in J.-P. Migne *Patrologiae Cursus, series Graeca*.

Galen: (ca 129–210 AD) Greek philosopher and physician. Born in Pergamum, he later travelled to Athens and Alexandria, and then to Rome, where he became physician to the emperor, Marcus Aurelius. He was a prolific writer on both philosophy and medicine, which he saw as intimately connected. *On the Natural Faculties* is in the Loeb Classical Library, translated by A.J. Brock, 1969.

Aulus Gellius: Grammarian of the second century AD; his *Attic Nights* (available in a Loeb edition by J.C. Rolfe, 1927; reprinted 1969) is a collection of short essays covering a wide range of topics. It preserves a great deal of information and many quotations from earlier Greek and Latin works. The Greek text is also in the OCT series, edited by P.K. Marshall (1968; reprinted 1990).

Gregory of Nazianzus. See **Scholia**.

Harpocration (Valerius Harpocration): Alexandrian lexicographer of unknown date, perhaps first or second century AD.

Hippocrates: Greek physician from Cos (ca 460–370 BC). Although most Greek medical writings were attributed to Hippocrates, the medical corpus is actually a collection of works by multiple authors. Some of the oldest works in the Hippocratic corpus (ca 430–330 BC) are also available in the Loeb series; these discuss the views of early Greek philosophers.

Hippolytus of Rome: (ca 170 – ca 236 AD) Although Hippolytus was a Roman Christian, his *Refutation of All Heresies* was written in Greek. Hippolytus sought to tie Christian heresies to Greek philosophical views. His work both summarizes and quotes the philosophers, thus providing a valuable source of information about them. He was said to be Bishop of Rome, although his name does not appears in the papal lists. The text of *Refutatio omnium haeresium* is available in an edition by M. Marcovich, 1986.

Iamblichus: Neoplatonist philosopher (probably ca 245–325 AD). Born in Syria, he is said to have studied with Porphyry and wrote a number of treatises on Pythagoras and Pythagoreanism. His *Exhortation to Philosophy* (*Protrepicus*; ed. H. Pistelli, 1888) contains extracts from earlier philosophers. The authenticity of the *Arithmetical Theology* (ed. V. de Falco, 2nd ed. 1975) is in doubt, and is usually attributed to the so-called Pseudo-Iamblichus.

Irenaeus: Second-century AD Christian theologian, author of a large anti-Gnostic work called *Against Heresies* (J.-P. Migne *Patrologiae Cursus, series Graeca*).

Isocrates: (436–388 BC) Athenian orator and essayist, reported to have been a pupil of both Gorgias and Socrates. There are Loeb editions (trans G. Norlin and L.R. van Hook, 1969) of his speeches (which are more like essays, since they were not intended for oral presentation).

Josephus (Flavius Josephus): Jewish historian, born 37/8 AD. While in Rome, late in his life, he wrote *Against Apion*, a defence of Judaism. There is a Loeb text, translated by H. St. J. Thackeray, 1969.

Lucretius (Titus Lucretius Carus): First-century BC Roman poet and philosopher. His *On the Nature of Things* (*De Rerum Natura*) is a defence of Epicureanism against competing theories. Lucretius's summaries of and attacks on rival views are important sources for earlier philosophical positions. There are many translations and texts available; in the Loeb series *De Rerum Natura* is translated and edited by W.H.D. Rouse, revised by M.F. Smith, 1975.

Martianus Capella: Fifth-century AD North African proconsul. His treatise *The Marriage of Mercury and Philology* (*De Nuptiis Mercurii and Philologiae*) was an allegorical representation of the marriage of the liberal arts and eloquence, which includes some information about Greek cosmological theories. The Latin text is in the Teubner series (edited by Adolf Dick); a translation is available from Columbia University Press. Martianus Capella was mentioned by Copernicus (in *De Revolutionibus*) as a proponent of a theory in which Venus and Mercury orbit the sun rather than the earth.

Olympiodorus: (ca 510–565 AD) Late Platonist commentator on both Aristotle and Plato. His *Commentary on Aristotle's Meteorology* is in the CAG, vol. 12, part 2.

The Parian Marble (Marmor Parium): Inscribed stele set up at Paros, giving dates for important events, including religious, military, political, and literary events. A text can be found in F. Jacoby *Das Marmor Parium* (1904).[4]

Philodemus: Epicurean poet, philosopher, and writer with a wide range of interests, first century BC. Having studied in Athens, he settled in Roman Italy. Most of his works are known through fragmentary papyri found in the Villa of the Papyri at Herculaneum; new editions are being prepared and published, including *On Piety* and *On Rhetoric*, the two sources for our testimonia about Anaxagoras. A marvellous introduction to the history of the Villa, the excavations, and the problems in dealing with its carbonized papyri can be found in David Sider's *The Library of the Villa dei Papiri* (Los Angeles: J. Paul Getty Museum 2005).

Philostratus (Flavius Philostratus): (born ca 170 AD.) Studied philosophy at Athens; author of a *Life of Apollonius of Tyana*. The text was edited by C.L. Kayser, *Flavii Philostrati opera*, vol. 1 (Leipzig, 1874; repr. Hildesheim, 1964). It may be found in the Loeb Series, ed. and trans. F.C. Conybeare, 1969.

Plato: (427–347 BC) Pupil of Socrates, founder of the Academy at Athens. One of the most eminent of philosophers. The texts of his marvellous philosophical dialogues are available in many Greek editions, including the OCT and Loeb series. English translations in J. Cooper, ed. *Plato: Complete Works* (Indianapolis and Cambridge, Mass: Hackett Publishing Co. 1997).

Pliny the Elder (Gaius Plinius Secundus): First-century AD author of many works, including a comprehensive *Natural History* (Loeb edition, trans. by H. Rackham, 1969). Having gone to observe the eruption of Mount Vesuvius in August of 79, Pliny was overcome by poisonous fumes and died.

Plutarch: Erudite Platonist philosopher (ca 45–124 AD) and prolific author (an ancient catalogue lists 227 works), his writings include comparative biographies and philosophical treatises (positive interpretations of Platonism and attacks on other philosophical schools). His extant works are

4 The interpretation of the Parian Marble is highly controversial. For a discussion, see Appendix II in W.R. Connor 'City Dionysia and Athenian Democracy' *Classica et Mediaevalia* 40 (1989) 7–32.

collected under the name *Moralia* and can be found in a multi-volume Loeb edition. A work called *Placita* and attributed to Plutarch in the ancient world is a source for Aëtius; it was edited by Diels in DG. Its author is now referred to as Pseudo-Plutarch (often indicated by using brackets, thus, [Plutarch]).

Proclus: Platonist philosopher of the fifth century AD; head of the Academy at Athens. A prodigious scholar and commentator on both Plato and Euclid. The text of the *Commentary on the Timaeus* was edited by E. Diehl (Teubner 1903–6); that on Euclid by G. Friedlein (Teubner 1873).

Michael Psellus: Byzantine philosopher (1018–1078/9 AD) Author of a number of works, including philosophical and scientific treatises.

Scholia: Marginal notes on manuscripts. These often explain the text or refer to views either mentioned briefly in the text or suggested to the scholiast by the text of the manuscript. For the study of Anaxagoras, one of the most important is the **Scholium on Gregory of Nazianzus**, which contains the text that is now referred to as fragment B10. Gregory was a Christian theologian of the fourth century AD. The scholium that contains B10 was written as a note on a funeral oration by Gregory in the course of which he refers to the ancient doctrine of everything in everything. In comprehensive discussions of the passage, Schofield, supported by Sider, suggests that the scholium can be traced back to Eudemus of Rhodes (a pupil of Aristotle). (See the notes on B10; the text is in J.-P. Migne *Patrologiae Cursus, series Graeca*.) Mentions of Anaxagoras and his views included in the testimonia can be found in scholia on the poets Homer and Pindar, and on the tragedians Aeschlyus and Euripides, as well as on Apollonius Rhodius (third-century BC author of an epic poem about Jason and the Argonauts) and Aelius Aristides (a Greek rhetorician and author of the second century AD).

Seneca (Lucias Annaeus Seneca the Younger): (ca 1 BC – 65 AD) Roman politician (adviser to the young Nero), philosopher, and prolific writer. He was born in Spain and received a philosophical education in Rome. His *Questions about Nature* was written after he had (prudently) retired from public life (and from Rome) during the later reign of Nero; *Naturales Quaestiones*, books 1–3, translated by T.H. Corcoran, is in the Loeb Series.

Sextus Empiricus: (*fl* ca 200 AD) Greek physician and philosopher; defender of ancient academic scepticism. The *Outlines of Pyrrhonism* is available in the Teubner series (ed. H. Mutschmann and J. Mau) and with an English translation in the Loeb series (ed. J.B. Bury, 1933–49), as well as in a translation by J. Annas and J. Barnes (*The Modes of Scepticism*, Cambridge University Press 1985).

Simplicius: (ca 490–560 AD) Platonist philosopher and defender of pagan philosophical traditions. One of the most important sources for the Presocratics. Many fragments of Anaxagoras and Parmenides are preserved only in Simplicius's works (his commentary on Aristotle's *Physics* is especially valuable), and he also preserves parts of some otherwise lost works of Aristotle. Simplicius commented on many of his philosophical predecessors, including Plato and Aristotle, and although many of his works are lost (including a summary of Theophrastus's *Physics*), he is invaluable as a resource for ancient philosophy. His commentaries are in CAG, vols. 7–11. English translations are appearing in volumes published by the Ancient Commentators on Aristotle project, directed by R. Sorabji.

Ioannes Stobaeus (John of Stobi): Fifth century AD. Author of an enormous anthology of excerpts from more than five hundred Greek writers on many topics of which only two fragmentary works survive: the *Selections of Physical Opinions* (*Eclogae Physicae*) and the *Anthology* (*Florilegium*). The texts were edited by C. Wachsmuth and O. Hense (1884–1923). In the *Eclogae*, Stobaeus included large parts of Aëtius (those texts are included by Diels in DG).

Strabo: (ca 64 BC – some time after 24 AD) Greek historian and geographer. An edition of his *Geography* is in the Loeb series, edited by H.L. Jones.

The Suda (also *Suidas*): Tenth-century AD lexicon assembled from many ancient sources. The text was edited by A. Adler, 1928–38; reprinted 1971.

Tertullian (Quintus Septimus Florens Tertullianus): From Carthage, one of the first Latin Christian theologians (160–ca 240 AD), he defended Christianity in his *Apologeticus* (written ca 197; ed. T.R. Glover in the Loeb series, 1969).

Theophrastus: Pupil and colleague of Aristotle (ca 370–ca 287 BC); in 322 he succeeded Aristotle as head of the Lyceum. Like Aristotle, Theophrastus was an encyclopedic author, but most of his works are lost. Surviving in fragments, his work *Physikai Doxai* (*Opinions on Physical Questions*), which may have included his discussions of perception (*De Sensibus*), is an irreplaceable source for information about the Presocratics.[5] The texts are in Diels, DG. A new set of studies of Theophrastus is in process: *Theophrastus of Ephesus* ed. W.W. Fortenbaugh (Brill).

5 For fuller discussions of the importance of Theophrastus as a source, see Mansfeld ('Sources'), Runia ('Sources'), and Mansfeld and Runia (*Aëtiana*). There is debate about the title of Theophrastus's book; Mansfeld and Runia opt for *Physikai Doxai* (*Opinions on Physical Questions*); other scholars retain the traditional *Physikōn Doxai* (*Opinions of Natural Philosophers*).

Valerius Maximus: Compiler of an early first-century AD collection of anecdotes, *Memorable Doings and Sayings*. The Loeb edition was translated by D.R. Shackleton Bailey, 2000.

Varro (Marcus Terentius Varro): (116–27 BC) Roman public figure and writer. Author of many works, a few of which survive, including a treatise *On Farming* (included in the Loeb Classical Library, trans. W.D. Hooper and H.B. Ash, 1969).

Vitruvius Pollio: First-century BC Roman engineer and architect, author of a Latin treatise on architecture; there is a Loeb edition by F. Granger (1931–34).

Xenophon: Athenian soldier and historian (ca 428–354 BC); friend of Socrates. His *Memoirs of Socrates* and other works present a different picture of Socrates from that found in Plato's dialogues. His Socratic writings are available in Loeb editions edited by E.C. Marchant and O.J. Todd (1969).

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GENERAL INDEX

For names of modern scholars, refer to the Index Nominum; for specific passages in ancient authors, refer to the Index Locorum; see also the Index of Greek Words. References to pages in the Notes on the Fragments will guide the reader to the text and translation of the appropriate fragment.

accretion, 41. *See also* compounding
Achilles, 235–36
acme, 130
Aegospotami, 78, 81, 82, 83, 132&n8, 209–10, 233
Aelian, 236
Aeschylus, 92, 118, 132, 132–33n13, 233, 241
aether, 35–36, 96, 110, 113, 157, 166–67, 178&n1, 184–85n14, 209
Aëtius, 236
Agatharcus, 92–93
air (*aēr*), 35–36, 109, 111, 143, 157, 166–67, 178&n1, 184–85n14; in *clepsydra*, 108–109; as meteorological force, 95, 223–34; noisy in daytime, 111, 223
Alcidamus, 236
Alcmaeon of Croton, 92, 124, 126&n47
Alexander of Aphrodisias, 202, 236
all things together, 33, 42–45, 50–51, 98–99, 99, 100, 103–104, 105, 153, 179, 190–91. *See also* everything-in-everything
alteration, 103
Ammianus Marcellinus, 236
amount. See *plēthos*
analogy, arguments by, 66n65
Anaxagoras: and Anaximenes, 80, 81, 82, 93, 102, 129, 211&n17, 223; arguments in, 115, 137, 196–97; atheism of, *see* impiety of; in Athens, 78, 81, 82, 91–92, 129, 130–31, 131nn7–8, 132, 142, 233; biological interests, 53; book, 79, 92&n12, 100, 136–37; character, 78–79 87, 90–91; chronology, 77–78, 80, 81, 129–31; death of, 91, 129; and Democritus, 79, 80, 142, 233; and Derveni Papyrus author, 143&n35; dogmatism in 41&n20; Eleatic principles in, 39, 142, 196,

198, 229; and Empedocles, 82, 96, 133&nn14, 15; and Euripides, 86–87, 132, 132–33n13, 233; on goal of life, 89, 90, 137; on happiness, 89–90, 90–91; and Heraclitus, 53n38; on Homer, 78–79; impiety of, 85, 91–92, 125, 129, 132, 136, 233–34; imprisonment, 92; on insoluble questions, 93; interest in nutrition and growth, 179–80, 179n4; and later Greek thought, 142–46, 233–34; Medism, 79, 131n4; metaphysical interests in, 53, 133, 137, 156n8, 167n29, 177, 179n4, 198, 229; and Pericles, 79, 80, 83, 84, 85, 86, 90, 129, 136, 142; as prognosticator, 78, 80, 82, 83, 95, 132&nn9–10, 210–11; range of interests in, 17, 82, 137, 206, 233; as scientific innovator, 233; and Socrates, 134–36, 135n16, 136nn20–21; trial of, 79–80, 91–92, 132, 136; and Zeno, 39–40
Anaxagoreans, 104, 112, 125
Anaximander, 34, 107
Anaximenes, 35, 80, 93, 102, 107, 114, 116, 120, 129, 143, 211&n17, 223
animals, 78, 95, 122–23, 122n46, 125, 157; generation of, 175–76n50; perception by, 228&n64, 231n68; plants as earthbound, 125, 175n48
apeiron. *See* unlimited
appearances as glimpse or sight of unseen, 177, 196, 232–33
Appollonius Rhodius, 241
Apollodorus, 237
Aratus, 235–36
Arcesilaus, 120
Archelaus, 81, 82, 88, 107, 120; and Anaxagoras, 134&n18, 135
Aristophanes, 132n11
Aristotle, 4–5n5, 106, 136, 141, 143, 170–71, 179n4, 234, 237; on Anaxagoras and the Atomists, 151, 183–84n10; on Anaxagoras and Empedocles, 96&n17, 133&nn14–15; on fire and aether in Anaxagoras, 35n6; on homogeneous stuffs, 96, 98, 147–50, 147n43, 150n50, 164n23; on *Nous*, 66n65, 98–99, 104, 106, 146&n40, 192&n1, 201, 202–203, 204–205&n23; on the original mixture, 106; *panspermia* in, 98, 149–52, 151n53; on *physiologoi*, 4, 4–5; on senses of 'one,' 141&nn30–31; on soul and *Nous*, 55, 61, 146, 176, 192, 205; teleology in, 101, 146, 205; treatment of Anaxagoras, 145–52, 145nn37–39; treatment of predecessors, 5–6, 145, 150n51; unmoved mover, 146n40
artefacts, 44–45, 157–58n10, 158, 159–61. *See also* natural artefacts
Aspasius, 237
Athenaeus, 237
Atomism, 34, 142&nn33–34, 183–84n10
atoms, 99
axe, 51–52, 164n23

B10, authenticity of, 164n23
B12, structure of, 195n5
basic things, 48, 51, 150, 171, 188, 198–99, 220; always mixed, 178–79; kinds of, 141, 200n14; large and small, 186
beans, lima, 173–74
biography, ancient, 130–31
bitter, 117–18
Black Sea, 223
blending of ingredients, 181&n8

blood, 123, 157, 168
bronze, 157–58n10, 160

causation, causes, 145, 202–203, 207–208, 211n16, 220, 222
Cedrenus, 237
Censorinus, 174, 227, 237
chance, 84, 85, 101, 107, 123, 168–69, 207n3. *See also* coming-to-be, passing-away
change, 179–80, 231–32
Charmander, 113
Chersonnese, 132
chrēma, *chrēmata*, 33–34, 57, 100, 200n14; meaning of in Anaxagoras, 51. *See also* things
Cicero, Marcus Tullius, 237
cities, 16n3, 159, 221–22
Clazomenae, 88, 91, 129n1
Cleanthes, 112
Clement of Alexandria, criticism of *Nous*, 104, 237
clumping, coagulating, 37, 67. *See also* compounding
clepsydra (water clock), 84, 108n28
clepsydra (water/wine lifter), 108&n28, 108–109, 208, 232
clouds, 71–72, 104
cold, 51, 109; and compaction, 72. *See also* hot
colour, 46, 120, 121, 230n67, 231, 232
comets, 78, 82, 113, 209–210
coming-to-be, 72–73, 93–94, 98, 99, 103, 145, 153–54, 154n3, 160n15, 170, 172, 173, 179, 197; and alteration, 103, 145; and mixture, 102, 145, 154, 160–61, 197
compaction, compounding, compounds, 44–45, 71–72, 93–94, 149–50, 158–59n12, 161–63, 174, 186, 206–207, 217, 226
complexity, 50, 215–16
contexts (of Presocratic fragments), 4
cosmos, 51, 210–11; as intelligible, 69, 203–204; order in, 68–69, 197–98, 204; perishable, 107; revolution and, 61; single, 106, 107, 214, 217–18, 218–19, 220–21
cutting, 39, 183n9
Cyril of Alexandria, 237

daffodil, 172
death, 123, 124–25, 175, 182. *See also* dissociation
Democriteans, 104, 112, 125
Democritus, 93, 99, 107, 111, 112, 113, 116, 120, 124, 126, 130, 152n55, 231n69; and Anaxagoras, 79, 80, 233
dense (and rare), 109
density or concentration (of ingredients) 147–48n44, 178, 181–82, 184–89, 184nn11–12
Derveni Papyrus, 143&n35, 195n6
Descartes, 168n33
desire (in plants), 125
destruction. *See* passing-away
Dicaearchus, 115
Diodorus Siculus, 238
Diogenes of Apollonia, 107, 120, 124, 125, 143
Diogenes Laertius, 129n1, 238
discernment: aspect of *krinō* verbs, 9–10; *Nous* and, 60
dissociation, dissociate, 9, 41, 47–48, 62, 68, 73, 102, 103, 141–42, 176–77, 208
divisibility, infinite, 96, 183–84, 184nn9–10, 186n15
dog(s), 67, 157, 168, 176–77, 188
dominance, 187. *See also* predominance
doxography, doxographers, 146&n40

Earth (home planet), 70–71, 157, 208–209, 223&n50; place of, 116, 208–209, 220–21; shape of, 78, 94, 115–16, 208–209, 208–209n8, 210&n12
earth (stuff), 46, 70–71, 71–72, 93–94, 166–67, 220–21
earthquakes, 78, 95, 116–17, 224–25
echo, 123
eclipses. *See* moon, sun
eggs, 175n48, 177, 226n57
egg whites, 76, 175n48
Eleatic principles, 39, 43, 53–54, 72–73, 142&n33, 153–54, 156, 173, 174n47, 179n4, 185, 191
elements, 98, 104, 105, 145, 148–49, 151, 165n25
embryological models in Presocratic thought, 36, 172n42
embryology, 95, 123–24, 174, 225–28, 226n57
emergence, 162n16, 184–85, 184nn11–12
emergent (artefacts) 159, 160–61, 180–81
emergent (ingredients or stuffs), 38, 180–81, 184–88, 191
Empedocles, 107, 108n28, 116, 120, 121, 124, 126, 142n33, 162, 196, 227, 233n70; and Anaxagoras, 133&nn14–15; on coming-to-be, 73; Love and Strife in, 196, 200n14
Epicurus, 88, 120, 124
equality of shares and ingredients, 50, 48–50
ergon, 44–45
Ethiopia, 118
Eubulus, 77, 129n1
Eudemus of Rhodes, 53–54, 53n40, 101, 105, 111, 241
Euripides, 78, 86–87, 118, 124–25, 132, 132–33n13
Eusebius, 238
everything-in-everything, 7, 43–44, 48–49, 50–51, 54, 57, 74, 93–94, 97–98, 99, 144, 147n44, 178–91, 199, 230; and expansive ontology, 158; *Nous* and, 57, 58–59, 199; and nutrition and growth, 178–79, 178n4, 180; and unlimited smallness/largeness, 183–84n10, 188–89
existence, 162–63, 163n19
explanation, 61, 93, 170; and opposites, 167–69
extent, 99. See also *plēthos*

fate, 107
fire, 98&n23, 110, 113–14, 137n23, 157; and earthquakes, 116–17
fish, 125, 168
flesh (and/or bone), 53–54, 96, 96–97, 98, 99, 157, 167, 169–70, 188; types of, 168&n31
food, 123, 126
force, 52
form. *See* structure
Forms (Platonic), 144, 176n52

Galen, 238
gall bladder, 123
Gellius, Aulus, 238
genesis, generation. *See* coming-to-be
geological phenomena, 224–25
gills, 125
gnomē (discernment), 194, 195–96n8
Goat River. *See* Aegospotami
god, 101, 184–85, 185n13
gold, 49, 93, 147, 167
Greeks, the, 72–73, 154, 198

Gregory of Nazianzus, 238; scholium on and authenticity of B10, 53–54
growth, 155, 156, 164n21, 167n29, 179–80; on homunculus view of seeds, 173–74

hail, 114, 223, 233
hair, 53–54, 164n23, 169
hands, 122
Harpocration, 238
heavenly bodies, 70, 94, 208, 210–12, 222
heavens, vault of, 78, 95
Hegesibilus, 77, 94, 100, 129
Heracleides, 120
Heraclitus, 195&n7, 204, 228n63; unity of opposites in 52n38
Hermotimus of Clazomenae, 104, 205&n23
Herodotus, 233; *ergon* in, 44–45
Hippocrates, 238
Hippolytus of Rome, 239
Hippon, 124
Homer, 115, 241
homogeneity of *Nous*, 64–65n60, 65n61
homogeneous stuffs, 11, 78, 93, 96, 98, 99, 100, 102, 103, 123, 147–50, 153, 164–65, 164n23, 165n24, 166, 168n34
homoiomeria, homoiomereity, principle of, 96, 147n43, 165n24, 166, 177. *See also* homogeneous stuffs
homunculus interpretation of seeds, 155–56, 172–75; criticism of, 173–75; definition of, 172–73n44
hot, 51, 109, 168. *See also* cold
houses, 157–58n10
human beings, 157, 168, 217; human agency, 157–58n10, 160–61, 217; *Nous* in 66–67n66;

husteros, relation of Anaxagoras and Empedocles, 133&nn14–15

Iamblichus, 239
ibis, 125
immateriality: in Greek thought, 59–60, 195n7, 200–201&n4; of *Nous*, 59&n60, 69n70
ingredients, 45, 46, 47, 48, 70, 72–73, 141–42, 145, 154, 156–57, 157–58, 157n10, 158–59n12, 161, 170, 171, 188, 200–201; all ingredients always together everywhere, 180–81, 182–83; distribution of, 187; identification of, 189–90; impossible purity of, 182–83, 190–91; known by *Nous*, 145, 171n39, 191, 198–200; large and small, 186–88; list of, 171&n39; theoretical purity of, 190–91
intelligence, 122; cosmic, 195–96; in plants, 126. See also *Nous*
Irenaeus, 239
Isocrates, 239

joining together, 9
Josephus, 239
judge, judgment, judging, 139. See also *krinein*

Kate, 173–76, 181, 189, 231n68
kosmos. *See* cosmos
knowledge, 231–33
krinein, 9, 75, 139

Lampon, 85, 136
Lampsacus, 78, 79, 88, 91, 131, 136
large, largeness, 38, 40, 94, 177n54, 182–85; as density, 184–88, 184nn11–12; equal to small, 40, 49; unlimited, 35, 38–42, 94, 185. *See also* small, smallness

laws of nature, 204&n23
Leucippus, 107, 142n34
lightning, 78, 95, 113, 114, 223–24, 224n51
likeness (of *Nous*) 64–66
living things, 43–44, 225–29. *See also* animals, human beings, plants
Lucretius, 239

magnitude, multitude, 34. See also *plēthos*
manifest, manifestness, 75, 93, 169n35, 178. *See also* large
manufactured items, 44–45, 217, 219, 221–22. *See also* artefacts
marrow, 124
Martianus Capella, 208–209n8, 239
mass terms, 34
materialism/immaterialism, 59–60, 59n50, 200–201, 200n14
matter, 94, 95, 141n32
Max, 172–73, 175
Meletus (accuser of Socrates), 142–43
Melissus of Samos, 43n24, 92, 121, 141&nn31–32
metals, 157
'metaphysical question,' 180&n5
meteorological phenomena, 71–72, 78, 222–25, 234
meteors, 95, 132&n10, 209–10, 209n11, 233
Metrodorus of Chios, 107, 112, 121
Milky Way, 78, 95, 112–13, 210
Mind (*Nous*), 6, 7, 54–56, 78, 94, 100–101, 141, 143, 192–205; early Greek views of, 195&n6; in plants/animals, 61; in some things, 54–56. See also *Nous*
mixture, 43, 46, 57, 98, 99, 103, 104, 141–42, 150, 206–207, 230; and coming-to-be, 160–61, 160n15, 174, 175, 197, 230; completeness of, 181–82, 187; as method of change or growth, 41–42, 54, 62, 73&n75, 155, 157–58, 161, 175; uniformity of, 184–85, 187
mixture, original, 33, 41, 45–47, 51, 106, 154–55, 178, 198–99, 219, 230; contents of, 46–47, 51, 155&n6, 158, 158–59n12, 159n13, 166–67, 175, 178, 204; motionless, 101, 105, 178
mixture, temporary, 41–42, 43, 44, 72–73, 157–58, 160–61, 182–83, 198–99, 226. *See also* artefacts, natural
mixture, universal, 46, 51, 98, 99, 100, 145, 178–79, 179n3, 180
mock suns, 114, 223&n49
monism. *See* Parmenides
moon, 63, 71, 73–74, 78, 85, 90–91, 95, 111, 208, 210–211; character of, 78, 111, 112, 210–211&n15; eclipses of, 95, 111, 211–212, 233; light from the sun, 111, 211&n15; objects fallen from, 111, 111–212n33, 112; phases of, 95, 111; turnings of, 95
mortals, 138, 140n28. *See also* Greeks
motion, 102–103, 105, 107
mudros, 86
multiple worlds, 45, 212–22; micro-worlds model, 213–14, 215–18, 221–22; *Nous* and, 217–20; ontological levels model, 212–13, 214; other places on Earth model, 213&n22, 214; other places in the solar system model, 213n22, 214, 219–22; other places in the universe model, 213, 218–19; thought experiment model, 213&n23, 214–215

natron, 118
natural artefacts, 43n25, 54, 72–73, 161–62, 170–71, 181, 198–99, 226;

character of, 231; definition of, 161; and *Nous*, 199; and seeds, 198–99
natural objects, 157–58, 222–25, 230–31. *See also* natural artefacts, phenomenal objects
natures, 189n22, 197, 199, 199–200, 204, 232–33
Nemean Lion, 111, 111–12n33
Nile, 95, 118–19, 225&n54. *See also* rivers
Noos, in Parmenides, 139–40, 139n27
Nous (Mind), 192–205; ancient view of Anaxagoras's theories of, 54–55, 94, 192, 202–205; all alike, 64–66; in all living things, 122, 225n55; awareness of world, 204; as cause, 45n27, 55, 66, 67–68, 78, 93n13, 94, 98–99, 100–101, 104, 121, 154n1, 176, 194, 197–99, 201–203, 207–208, 220, 222; character of, 57–67, 64–65n60, 65n61, 104, 193–94, 194n3, 200–202, 203–204; control, 60–61, 62–63, 101, 104, 176, 193–95, 202, 207, 225; cosmic *Nous* ('big' *Nous*), 193n2, 202–204; as cosmic mover, 176, 194, 201–203, 208&n7, 220; as creator, 61, 66, 101, 201n17, 218&n38, 219–20; as critical faculty, 194n4, 195–96n8, 197; and discernment, 194, 196–97, 218; fineness of, 59, 200n14, 201–202; as god, 101, 102, 143; impassible, 104, 122, 203–204; independence of, 57–58, 104, 200–202, 203–204; intelligence and, 66, 66–67n66, 194–95; as knower, 51, 56, 50, 62, 122, 141–42, 150, 171n39, 174, 191, 193, 194–95, 196–99, 199–200, 201n15, 203–204, 218, 219–20; material or immaterial? 200–201, 200n14, 201n16, 203–204; and motion, 104, 121–22, 178, 194–96, 202–203, 205; and multiple worlds, 217–20; as ordering force, 104, 154n1, 196–98, 200–204, 220; and perception, 203–204; as practical wisdom, 122; presence in cosmos, 68–69, 104, 200, 201, 202; powers of, 56–67, 104, 122, 191, 193, 197–99; purity of, 57–59, 64–65, 104, 122, 193–95, 200–202, 200n14; and seeds, 176–77, 176n51, 199, 202n18; in some things, 54–56, 141–44, 179, 193–94, 201, 202–204, 225–26; and soul, 56, 60–61, 104, 121–22, 175, 176&n51, 225–26; strength of, 60–61, 101; and structure, 171; and teleology, 100–101, 219–20; translation of '*nous*,' 54–55; in us ('small *nous*'), 177, 192n2, 196, 202, 203–204; and world-making, 141, 200–205
number. See *plēthos*
nutrition, nourishment 97, 99, 100, 156&n8, 164n21, 169, 173&n45, 179–80, 232

Olympiodorus, 240
ontology, austere, 154, 156–57, 190&n25; criticism of, 163–70; and perception, 167, 169–70; and seeds, 171, 171–72n40; statement of, 156n9
ontology, expansive, 154–56, 170; criticism of, 158–63; and nutrition and growth, 155; seeds in, 156n7, 161–62, 162n16; statement of, 154–55n4
ontology, moderate or intermediate, 6, 154, 157–71, 168n34
opposites, 51–52, 148n47, 155, 156–57, 171–72n40, 189; co-presence of, 40n18, 46, 51–52, 64, 70–71; in

explanation of change, 163–66; in perception, 165, 228–29. *See also* austere ontology
orchestra, 92&n12
original mixture. *See* mixture, original
original state, 33–36, 45–46, 47, 153, 182–83; as motionless, 67, 198, 207. *See also* mixture, original
other worlds. *See* multiple worlds

pain (and sense perception) 119–20, 228–29, 228n66
panspermia (seed-mass), 98, 151–52, 151nn53–54, 227n62
parahelia. *See* mock suns
Parian Marble, 240
Parmenides, 92, 112, 120, 121, 124, 130, 134, 141, 142n33, 174, 195, 227; and Anaxagoras, 6–7, 133, 137–42, 180, 229; and cosmology, 139–40, 139n26; denial of coming-to-be and passing-away, 137, 162–63, 174n47, 180; inquiry in, 138; judgment in, 139; knowledge in, 198, 204; monism in, 140–41, 141n31; summary of his views, 138–141; use of *chrē* in, 60n64
participation (Platonic), 144
particles, particulate, 49, 102, 181&n8, 183–84, 183n9, 183–84n10
passing-away, 72–73, 153–54, 154n3, 170, 176–77
pelekus. *See* axe
perception. *See* senses
Pericles, 129, 130, 136&n21, 233
Peloponnese, 95, 110
perspective, explanation of, 92–93
phenomenal objects, 156–57, 157–58, 170–71, 177, 188–89, 188n10, 188–89n21, 190–91, 191n29; as composites of opposites, 156–57, 164–66
Philodemus, 240
Philostratus, 240
physiologos, *physiologoi*, Aristotle on, 4&n5
Pindar, 241
planets, 208
plants, 125, 126, 157, 175&n48, 225–26
Plato, 106, 111, 112, 121, 143, 179n4, 180, 240; on Anaxagoras, 26n13, 143–44, 233–34; Anaxagorean influence on, 143–44, 234&n71; Forms in, 144–45; on *Nous* in Anaxagoras, 192, 204; opposites in, 40n18, 103–104; *panspermia* in, 151&nn53–54; and teleology, 100–101, 136&n20, 144–45, 192, 204
Platonists, 125
plenum, 73, 142, 182, 208
plēthos (amount, extent, number), 34, 46, 48n31, 175, 181, 185
Pliny (the Elder), 209–10, 240
Plutarch, 209, 240–41; as source, 26n13
portions, 55n44, 201n16
Posidonius, 90
practical wisdom, 122, 195–96n8
predominance, 65, 97–98, 167–68, 178, 188–90, 188n20, 188–89n21, 190–91, 199, 201, 230–31
prēstēr, 224n51
Proclus, 241
proportions, 49
Protagoras, 121
proteros (relation of Anaxagoras and Empedocles), 133&nn14–15
Psellus, Michael, 241
publication, ancient, of books, 131&n7, 132–33n13, 137&n23
purity of *Nous*, see *Nous*, purity of; of stuffs, 65–66, 68, 178–79, 182–83, 190–91; theoretical, 190–91

Pythagoras, 112, 120, 121

rainbow, 74, 114, 223
rare, 109. *See also* dense
ratatouille, 160
ravens, 125
reason (understanding), 122, 191n29
regress problem, 183–84n10, 189–91, 190nn24–26
recombination, remixture, as shifting of ingredients, 182, 207, 208. *See also* mixture, temporary
repeatability, 61. *See also* structure
'repudiating question,' 53–54. *See also Index Locorum* B10, Scholiast
resemblance (of offspring), 124. *See also* embryology
respiration, 125, 126
rest, 102
revolution. *See* rotation
rivers, 94–95, 225
rocks. *See* stones
rotation (revolution), 36–38, 45, 75, 95, 177, 178–79, 205, 206, 220, 232; expanding, 37, 52–53, 61, 187–88, 207–208, 210n12, 218–19; here and elsewhere, 42–45, 45, 63, 212–22, 218–19, 220–21; and natural phenomena, 224; and *Nous*, 60–61, 61–62, 63, 199–200, 201–202, 202–203, 205, 220; power of, 208–10, 220; and separation, 63–64, 67–68, 178–79, 186n16, 187–88, 206–208, 218–19; speed and force of, 52–53, 207–208, 207n4, 220

Satyrus, 86–87&n9
scepticism, 120, 231–32, 231n69
Scholia, 241
Scholiast on Gregory of Nazianzus, 179n4, 241; on metaphysical question in Anaxagoras, 180
science, 189n22, 206–34; and metaphysics, 229–32
sea, 78, 94, 117–18, 225; salinity of, 117–18, 225
seeds, 43–44, 46–47, 76, 151–52, 151n53, 155–56, 157–58n10, 161, 162n16, 166–67, 171–77, 181n7, 183–84n10, 217, 226–28; as biological starting points, 172&n42, 175, 176–77, 226, 227–28; falling from sky, 125, 126, 175–76n50, 226n56; homunculus interpretation of, 172–75, 172–73n44; immortality of, 174&n47, 176n52; and *Nous* or soul, 176–77, 176n51, 199, 202n18, 226, 228; and opposites, 171, 171–72n40; and structure, 172, 175, 176–77; texts mentioning, 171; unlimited, 175
semen, 123–24, 227&n59
Seneca, 241
senses, sense perception, 74–75, 75–76, 111, 119–20, 169–70, 191n29; accompanied by pain, 119–20, 169n37, 228–29, 229n66; feebleness of, 230, 231; and knowledge, 228–33; mechanics of, 228–29; reliability of, 74–75, 75–76, 120–21, 230–33; as sight of the unseen, 75–76, 191n29; by unlikes, 228–29, 228n63
separate (adj.), 49, 50, 103, 182
separation, 9, 36–38, 45, 47–48, 49–50, 51–52, 62, 67–68, 71–72, 93–94, 98, 99, 103, 104, 124, 162–63, 175, 178, 216–17, 218–19, 220; complete, impossibility of, 49–50, 179n2, 182–83, 194n4; here and elsewhere, 212–22, 218–19, 220–22; and *Nous*, 194n4; and passing-away, 160–61, 160n15, 175, 176–77, 197

separation off, 41, 182, 186n16, 206, 207
separation out, 41, 186n16, 207
sex differentiation, 174, 175n49, 226–27, 227n59
Sextus Empiricus, 74–75, 241
shares, 49–50, 54–55, 64, 200. *See also* portions
shifting, of ingredients, 182–83
Simplicius, 165nn24–25, 242; Attic and Ionic dialects in, 40–42; on large and small, 186n16; on *Nous* as cause, 66n64, 68, 202–203; on the original state, 47; on other worlds, 212–13; quotation practice, 41n22; reliability of, 165n25; on structure of Anaxagoras's book, 42
size, 49, 50, 215–16. *See also* small, large
sleep, 123
small, smallness, 35, 38, 40, 177n54, 179, 187–88; as density, 184–88, 184nn11–12; equal to the large, 40, 49, 50; no smallest, 142, 172, 179n3, 182, 183–85, 190–91; and *Nous*, 64&n60; unlimited, 6–7, 35, 38, 94, 105, 180, 184–85, 230. *See also* large
snow, 118–19, 121
Socrates, 81, 88, 91–92, 120, 130, 132&n11, 192, 195–96n8, 209n10, 233–34; and Anaxagoras, 134–36, 135n19, 136nn20–21, 142–43; trial of, 135n19, 136, 142–43
Sophocles, 118, 233
Sosibius, 88
soul, 44, 120, 122, 175, 176n52, 205; and *Nous*, 56, 60–61, 121–22, 176&n51, 226; and seeds, 176&n51, 226, 228
sound, 119, 123
soup, 159–60
speed, swiftness, velocity, 52–53
sperm, 123, 174
Spot, 175
stars, 78, 95, 110, 111–12, 208–11, 232
stars, fallen, 78, 82, 83, 112, 209–10, 233. *See also* meteors
Stobaeus, Ioannes, 242
stoicheon, 148–49, 149n48. *See also* elements
Stoics, 107, 111, 124
stones, 72, 110; becoming stars, 209, 224; falling, 79, 81, 132&n10, 209–10, 233
Strabo, 242
structure, 43, 160n14, 170–71, 228. *See also* repeatability, seeds
stuffs, 46, 200; pure or isolated, 40, 50, 188, 189–90. *See also* ingredients
submerged (ingredients or stuffs) 38, 184–88
Suda, 242
sun, 63, 73–74, 74, 78, 80, 86, 91–92, 94, 110, 210, 223&nn49–50; eclipses of, 94, 211–12, 211n16, 233&n70; as red-hot metal, 78, 80, 110, 167, 209; size of, 95, 110; as stone, 110, 209&n10; source of moon's light, 111, 112; turnings of, 110
surrounding multitude, 37, 38, 69

teleology, 100–101, 192, 202–203, 204–205, 207n3, 219–20
Tertullian, 242
Thales, 112, 130n2
Themistocles, 131&n4
Theophrastus, 93, 112, 143, 147, 192&n1, 242; on Anaxagoras's theory of sense perception, 119–20, 165, 167, 169–70, 203, 228–29, 228nn63–65, 229n66; on Anaxagoras's theory of stuffs, 93–

94; on everything-in-everything, 94
things, 154, 220
thought, 140n28; and what-is, 140. See also *Nous*
Thucydides, 98n23, 137n23
thunder, 78, 95, 113–14, 223–24, 224n51
tilt (of the heavens), 78, 107, 210&n13
truth, 75, 76–77
turnings (of sun and or moon), 95&n15
typhoons, 224n51

universe. *See* cosmos
unlimited (*apeiron*) 37, 38, 51, 98, 153, 199, 201; meaning of, 35; mixture, 218–19
unseen bodies (under the moon), 112, 210, 211–12, 224

Valerius Maximus, 243
Varro, 243
Vitrivius Pollio, 243
void, 94, 96, 103, 107–108, 142
volcanic activity, 224
vortex. *See* whirl

water, 71–72, 117, 121
waterspout, 114
weasels, 125
what-is, 39; cannot not be, 39, 41n20, 138; nature of, 140; and thought, 139
what-is-not: cannot be, 154n3, 184–85; no coming-to-be from, 99, 100, 138
whirl, 36, 60–61, 70–71, 71–72, 83, 110, 116, 207n4, 208, 209n13, 218–19. *See also* rotation
wind, 78, 95, 114–15, 117, 223
world-order. *See* cosmos

Xenophanes, 121, 195&n7, 204
Xenophon, 209n10, 243

zebra, 231
Zeno, 39, 106, 121; Anaxagoras and, 39n16, 133, 134&nn16–17, 142; on divisibility, 39–40, 183n9
Zeus, 195n7

INDEX LOCORUM

Achilles, *Introduction to Aratus's Phenomena*, 13 (= A79), 112; 21 (= A77), 112

Aelian, *Miscellanies*, 8.13 (= A21), 87

Aeschylus

– *Eumenides*, 657–66, 132–33n13

– *Fragments*, 300, 132–33n13

– *Suppliant Maidens*, 559, 118; 559–61, 132–33n13

Aëtius

– 1.3.5 (= A46), 100, 154n3; 1.7.5 (= A48), 101; 1.14.4 (= A51), 103; 1.17.2 (= A54), 104; 1.25.9 (= A77), 112; 1.29.7 (= A66), 107

– 2.1.2 (= A63), 106; 2.4.6 (= A65), 107; 2.8.1 (= A67), 107; 2.13.3 (= A71), 110; 2.16.1 (= A78), 112; 2.20.6 (= A72), 110; 2.21.3 (= A72), 110; 2.23.2 (= A72), 110; 2.29.67 (= A72), 112; 2.28.5 (= A77), 112; 2.30.2 (= A77), 112

– 3.1.5 (= A80), 113; 3.2.2 (= A81), 113; 3.2.9 (= A82), 113; 3.3.4 (= A84), 113–14; 3.4.2 (= A85), 114; 3.5.11 (= A86), 114; 3.15.4 (= A89), 116; 3.16.2 (= A90), 117

– 4.1.3 (= A91), 118; 4.3.2 (= A93), 120; 4.5.11 (= A93), 120; 4.7.1 (= A93), 120, 176n52; 4.9.1 (= A96), 121; 4.9.6 (= A93), 120; 4.9.16 (= A94), 120; 4.19.5 (= A106), 123

– 5.7.2 (= A111), 124; 5.19.23 (= A112) 124–25; 5.20.3 (= A101), 122; 5.25.2 (= A103), 123

Alcidamus (in Aristotle's *Rhetoric*), 139b15 (= A23), 88

Alexander of Aphrodisias

– *Commentary on Aristotle's Metaphysics*, 27–28, 133n14

– *Commentary on Aristotle's Meteorology*, 49.13, 114

– *On Fate*, 2.165 (= A66), 107

Ammianus Marcellinus, *History*, 17.7.11 (= A89), 117; 22.26.22 (= A10), 82

Anaxagoras (DK59)

– *Testimonia*: A1, 60, 77–80, 117n35, 129&n1, 132&n9, 136, 142, 148, 167, 209n11, 210, 223, 224&n51, 226; A2, 80, 167; A3, 80; A4, 80; A4a, 80–81; A5, 81, 142, 233; A6, 81, 132&n9; A7, 3, 81–82, 129; A8, 82; A9, 82; A10, 82, 132; A11, 82–83, 132, 210; A12, 83, 132, 209,

212; A13, 83–84, 143; A14, 84; A15, 84, 108n28, 143, 148; A16, 85, 136; A17, 85; A18, 85–86, 211n16; A19, 86, 167; A20, 86; A20b, 86; A20c, 86–87; A21, 87; A22, 87–88; A23, 88; A24, 88; A25, 88; A26, 88; A27, 88–89; A28, 29; A29, 89; A30, 89–90; A31, 90; A32, 90; A33, 90–91; A34, 91; A34a, 91; A35, 71, 91–92, 132n11, 135n19, 136, 143, 209n10; A36, 92; A37, 92, 136; A38, 92; A39, 92–93, 142; A40, 93; A41, 93–94, 148, 167, 220n43; A42, 94–96, 71, 132n9, 175–76n50, 208n7, 210, 211, 212, 223, 224&n51, 225n54, 226, 227; A43, 96, 133, 147, 149, 167; A44, 96–98, 137n23, 148, 183n9; A45, 67, 98–99, 147, 152, 154n3, 155, 173n45, 179n4, 207, 232; A46, 99–100, 135, 143, 147, 148, 154n3, 155, 167, 179n4, 180, 232; A47, 100–101, 134, 136, 143, 192, 207n3; A48, 101–102, 207, 233; A49, 102; A50, 102–103; A51, 103, 148; A52, 103; A53, 103–104, 143; A54, 104, 144; A55, 104, 143, 146, 176n51; A56, 104; A57, 104; A58, 66n65, 104, 146, 205, 234; A59, 105, 207; A60, 105; A61, 105–106; A62, 106, 233; A63, 106, 214&n25; A64, 107, 207, 208n7, 214; A65, 107; A66, 107, 142; A67, 107, 210&n13; A68, 84n4, 107–108, 232; A69, 108–109, 209, 232; A70, 109; A71, 72, 110, 209, 211; A73, 110, 209n10; A74, 111, 223; A75, 111, 143; A76, 111, 210; A77, 71, 111–12, 142, 209, 210, 211n15; A78, 112, 142; A79, 112, 142; A80, 112–13, 210; A81, 113, 142; A82, 113, 209n11; A83, 113; A84, 113–14, 223, 224n51; A85, 114, 223&n50; A86, 114, 223; A86a, 115–16; A87, 115–16, 142, 208–209n8, 210n12; A88, 116, 142; A89, 116–17, 224; A90, 117–18, 225&n53; A91, 118–19, 225&n54, 233; A92, 46, 119–20, 165, 169, 228&nn64–65; A93, 120, 176n52; A94, 120, 228n65; A95, 120–21; A96, 121; A97, 121; A98, 121; A98a, 121; A99, 121; A100, 121–22, 146, 192, 205; A101, 122, 225n55; A101a, 66–67n66, 122; A102, 28–29, 76, 122–23; A103, 123; A104, 123, 148; A105, 123; A106, 123; A107, 123–24, 142, 227n69; A108, 124; A109, 124; A110, 124; A111, 124, 174, 227&n60; A112, 124–25, 233; A113, 125, 226n56; A114, 125; A115, 125; A116, 125, 175n48; A117, 126, 142, 175n48, 175–76n50, 226&n56

– *Fragments* (**bold-face numbers** indicate pages for the text and translation, *italic numbers* indicate pages for the Notes on the fragment):

B1, **14–15**, *33–36*, 37, 38, 41n20, 43, 45, 46, 51, 57, 61, 63, 94n14, 99, 103, 150, 152, 153, 157, 157–58n10, 160, 164, 166, 168, 169n35, 178, 179n2, 180, 181, 184, 185, 187, 199, 208n5, 216, 222&n47, 229

B2, **14–15**, 34, 35, *36–38*, 51, 62, 63, 69, 73, 157, 164, 168, 184, 185, 222&n47

B3, 7, **14–15**, *38–42*, 43, 49, 94, 134&n16, 154n3, 179n2, 180, 183n9, 184, 185, 186&n16, 217n35, 222n47, 229

B4, 18, 42, 157

B4a, 10, **16–17**, 37, *42–45*, 46, 47, 52, 54, 56, 61, 62, 63, 69, 151n53, 152, 155, 157, 159, 161, 166&n28,

169n35, 171, 172, 174, 177, 183–84n10, 193n2, 212, 214&n24, 215&n29, 216, 216–17n34, 217, 218n38, 219, 220, 221, 222n47, 225, 226
B4b, **18–19**, 34, 35, 37, 42, 43n23, 44, *45–47*, 51, 54, 64, 70, 151n53, 152, 155, 164, 166&n28, 168, 171, 172, 178, 183–84n10, 221n46, 222n47, 230n67
B5, **18–19**, *47–48*, 134, 184n12
B6, 6, 7, **18–19**, 37, 40, 43, *48–50*, 52, 54, 57, 64, 134, 155, 178, 179, 180, 181, 181–82n8, 182, 183, 184, 191, 215, 230, 234
B7, **20–21**, 37, *51*, 199
B8, **20–21**, 50, *51–52*, 58, 144, 157, 166, 180, 230
B9, **20–21**, *52–53*, 67, 69, 207&n4
B10, **22–23**, *53–54*, 154n3, 167&n29, 173, 179n4, 180
B11, 6, **22–23**, *54–56*, 57, 58, 59, 61, 64, 66n63, 67–68n67, 69, 75, 155, 176, 179, 180, 188n19, 193, 199, 200, 201n16, 202, 225, 230
B12, 6, **22–25**, 35, 37, 41, 44, 46, 48, 51, 52, 54, 55&n44, *56–67*, 68, 69, 70, 73, 93, 144, 147–48n44, 149, 150, 152, 155, 157, 164, 165, 166, 174, 176&n51, 178&n1, 180, 183–84n10, 185–86n14, 187, 188&n19, 189, 190, 191, 192, 193&n2, 194, 195&n5, 196&n9, 198, 199, 200&n14, 201&n16, 202, 207, 208n5, 218, 220, 225, 229, 230, 234
B13, **24–25**, 37, 48, 55, 56, 61, 62, 66n64, *67–68*, 69, 169, 185–86n14, 193, 199, 202, 207, 208&n5, 220n43
B14, **24–25**, 37, 46, 55, 56, 58, 67–68n67, *68–69*, 193, 200, 201n16, 202
B15, **26–27**, 64, *70–71*, 72, 157, 164, 165, 208&n5, 209, 210, 220, 221
B16, **26–27**, 37, 44, *71–72*, 155, 161, 164, 165, 167, 169
B17, **26–27**, 34, 37, 41, 43n25, 44, 46, 47, 48, 51, 54, 62, 67, 69, 71, *72–73*, 103, 142, 154&n3, 156, 159n13, 160, 161, 162&n16, 164, 168, 169n35, 170, 174n47, 175, 180, 186n16, 197, 198, 213, 217, 226
B18, **26–27**, *73–74*, 210, 211n15
B19, **28–29**, *74*, 222, 223
[B20], **28–29**, *74*
B21, **28–29**, *74–75*, 177, 204, 230, 231
B21a, **28–29**, 46, 53, 70, *75*, 177, 196, 203, 204, 206, 230, 231n69
B21b, **28–29**, *76*
B22, **28–29**, *76*, 175n48, 226n58
Anaximander (DK12), A10, 36
Anaximenes (DK13), A14, 211; A17, 114
Archelaus (DK60), A1, 134n18; A5, 134n18
Aristotle
– *De Anima (On the Soul)*, 404a4, 151n52; 404a25 (= A99), 121, 176; 404b1 (= A100), 121–22; 405a13ff. (= A55), 55, 104, 176n51; 405a13 (= A100), 122; 405b19 (= A100), 122; 413a20–25, 61; 429a18 (= A100), 122, 201
– *On Breath*, 470b30 (= A115), 125
– *On Coming to Be and Passing Away*, 314a11 (= A52), 103; 314a18 (= A46), 99–100, 148&n46; 314a18–20, 147; 314a28–b1, 149; 314a29, 151n52
– *Eudemian Ethics*, 1215b6 (= A30), 89; 1216a11 (= A30), 89–90

– *Fragments*, Rose 248 (= A91), 118
– *On the Generation of Animals*, 723a9–11, 179n4; 752b22, 76; 756b13 (= A114), 125; 763b30 (= A107), 123, 227; 763b31, 5n5; 769a29, 151n52; 769b2, 151n52
– *On the Heavens*, 270b24 (= A73), 110; 294b14 (= A87), 115, 208; 295a9 (= A88), 116; 301a12, 207; 302a28 (= 43), 96, 148n46, 149; 303a16, 151n52; 309a19 (= A68), 107–108; 365a14ff. (= A89), 116
– *Metaphysics*, 984a11 (= A43), 96; 984b15 (= A58), 104; 984b30ff., 66n65; 985a18–20 (= A47), 101, 220; 986b10–11, 141; 986b19–20, 141; 989a30 (= A61), 105–106; 989b30, 4; 1009b25 (= A28), 89; 1056b28 (= A60), 105; 1069b15 (= A61), 105
– *Meteorology*, 342b25 (= A81), 113; 345a25 (= A80), 112–13; 348a14 (= A85), 114; 348b13 (= A85), 114; 369b14 (= A84), 113
– *Nicomachean Ethics*, 1141b3 (= A30), 89; 1154b7 (= A94), 120
– *On the Parts of Animals*, 687a7 (= A102), 122; 677a5 (= A105), 123
Physics, 184b20–22, 165n24; 185b8, 141n31; 185b19–25, 141n31; 186a22–25, 141; 187a20ff., 145; 187a25–26, 148&n46; 187a26 (= A52), 103; 194a15, 202; 203a19–33 (= A45), 98–99; 203a21, 151n52; 203a24–30, 152; 205b1 (= A50), 102; 213a22 (= A68), 108; 256b24 (= A56), 104
– *Poetics*, 1447b15, 4–5n5
– *Politics*, 1259a6–19, 130n3
– *Posterior Analytics*, 93b21, 234
– *Sense and Sensibilia*, 441a6, 151n52; 441a18, 151n52

[Aristotle]
– *On Melissus, Xenophanes, and Gorgias*, 975b16 (= A50), 102; 976a14 (= A50), 102–103; 976b19 (= A50), 103
– *On Plants*, 815a15 (= A117), 126; 815b16 (= A117), 126; 816b26 (= A117), 126; 817a23 (= A117), 126
– *Problems*, 903a37 (= A74), 111; 914b9 (= A69), 108–109
Aspasius, *Commentary on Aristotle's Nicomachean Ethics*, 156.14 (= A94), 120
Astronomical Codex Vatic., 381 (= A87), 115
Athenaeus, *Sophists at Dinner*, 2.57b (= B22), 28–29; 5.220B (= A22), 87–88
Aulus Gellius, *Attic Nights*, 15.30 (= A21), 87

Cedrenus, *History*, 1.165 (= A10), 82
Censorinus, *On Birthdays*, 5.2 (= A107), 124; 6.1 (= A108), 124; 6.2 (= A109), 124; 6.3 (= A110), 124; 6.6 (= A111), 124
Cicero
– *Academica Post.*, 1.12.44 (= A95), 120–21
– *Academica Pr.*, 2.31.100 (= A97), 121; 2.37.118 (= A49), 102
– *On the Nature of God*, 1.11.26 (= A48), 102
– *On the Orator*, 3.138 (= A15), 84
– *Tusculan Disputations*, 1.43.104 (= A34a), 91
Clement, *Miscellanies*, 1.63 (= A7), 81; 1.78 (= A36), 92; 2.14 (= A57), 104; 2.130 (= A29), 89
Critias (DK88), B19, 87

Cyril of Alexandria, *Against Julian*, (= A4), 80

Democritus (DK68), B11, 231n69; B167, 36; B117, 120
Diodorus of Sicily, 1.7.7 (= A62), 106; 12.39 (= A17), 85
Diogenes of Apollonia (DK64), B3, 48; B5, 44
Diogenes Laertius, *Lives of the Philosophers*, 1.16 (= A37), 92; 2.6–15 (= A1), 77–80; 2.16, 134n18; 2.46 (= A25), 88; 5.42, 93; 9.34 (= A5), 81; 9.35 (= A5), 81; 9.41 (= A5), 81, 233; 10.12 (= A26), 88

Empedocles (DK31), A58, 110n30; B8, 73; B9, 36, 73, 160n15; B11, 72; B12, 48; B17.32–33, 54n43; B100, 108n28
Euripides
– *Alcestis*, 903 (= A33), 91
– *Fragments*, 288, 118; 839 (= A114), 125; 910 (= A30), 90; 912, 87; 913, 87; 944 (= A20b), 86; 964 (= A33), 91; 1018 (= A48), 101
– *Helen*, 3, 118
– *Medea*, 529, 59n51
– *Melanippe* (= A62), 106
– *Trojan Women*, 886 (= A48), 87, 101
Eusebius
– *Chronicles* (= A4), 80; (= A11), 83; (= A18), 86
– *Preparation for the Gospel*, 10.14, 13 (= A7), 81

Galen
– *Commentary on Hippocrates, Epidemics, II* (= A90), 117–18
– *On the Functions of the Parts of the Body*, 1.3 (= A102), 122
– *On the Natural Faculties*, 2.8 (= A104), 123
– *On the Theories of Hippocrates and Plato*, 4.7 (= A33), 90–91
[Galen], *History of Philosophy*, 3 (= A7), 82

Harpocration, *Lexicon* (= A2), 80
Heraclitus (DK22), B1, 195n7; B30, 195n7; B31a, 71n73; B32, 195n7; B41, 195n7; B60, 71n73; B64, 195n7; B67, 44
Herodotus, *Histories*, 1.51, 44; 1.93, 44; 1.203, 34; 2.22 (= A91), 119; 2.35, 44; 2.44, 45; 3.41, 44
Hesiod, *Fragments*, 394, 74
Hippocrates
– *Airs, Waters, Places*, 5, 110n3; 8, 117
– *On Regimen*, 1.4 (= A52), 103
Hippolytus, *Refutation of All Heresies*, 1.8.1 (= A42), 94–95; 1.8.12 (= A42), 175–76n50
Homer, *Iliad*, 2.146, 114

Iamblichus, *Protrepticus*, 8 (= A48), 102
Inscription on the Parian Marble, Ep. 57 (= A11), 82; Ep. 60 (= A4a), 80–81
Irenaeus, *Against Heresies*, 2.14.2 (= A113), 152n55
Isocrates, 15.235 (= A15), 84

Josephus, *Against Apion*, 2.265 (= A19), 86

Lucretius, *On the Nature of Things*, 830–914 (= A44), 96–98

Martianus Capella
– *On Geometry*, 6.590–92, 208–209n8

– *The Marriage of Mercury and Philology*, 6.590–92 (= A87), 115–16
Melissus (DK30), A5, 102n25; B2, 48; B3, 43n24; B5, 43n24; B7, 43n24; B8, 43n24; B9, 59
Munich Codex, 490s15 (= A40), 93

Olympiodorus, *Commentary on Aristotle's Meteorology*, 17.19 (= A19), 86; 49.13, 114

Parmenides (DK28), B1, 139n26; B1.28–30, 138; B1.29, 43n24; B1.32, 43n24; B2, 138, 139, 140, 154n3, 198n13; B2.3, 39; B2.5, 43n24; B2.7, 48; B3, 138, 194, 188n13; B4, 198n13; B6, 140n28, 154n3, 198n13; B6.1, 43n24, 72; B7, 140n28; B7.5, 9; B8, 139&n26, 140, 141, 163, 198n13; B8.1–6, 140; B8.7–8, 54n34; B8.9–10, 194; B8.15–18, 140; B8.34–36, 194; B8.38–41, 72; B8.11, 43n24; B8.22, 64–65n60; B8.54, 43n24; B10, 138, 139n26; B14, 73; B15, 73; B16, 202n18
Philodemus
– *On Piety*, c. 4a (= A48), 102
– *Rhetoric*, 2.180 (= A20)
Philostratus, *Life of Apollonius*, 1.2 (= A6), 81; 2.5 (= A6), 81
Plato
– *Apology*, 26d6–e4, 209n10; 26e7–d9 (= A35), 91–92
– *Cratylus*, 409a, 25n13; 409a9-b1 (= A76), 111; 409b5–8 (= A76), 111; 413c (= A55), 104; 424e4, 149n48
– *Hippias Major*, 283a4–6 (= A13), 84
– *Parmenides*, 128e6–130a1, 50; 130b8, 58
– *Phaedo*, 71b, 160n15; 72c (= A53), 103–104, 144; 74b, 40n18; 78d5, 58; 96c–d (= A46), 100, 179n4; 97b8–98c2 (= A47), 100–101; 100b6, 58; 100c4–6, 50; 100d4–e3, 50; 102b, 40n18, 160n15, 184n12
– *Phaedrus*, 269e (= A15), 84
– *Philebus*, 13a, 39
– *Republic*, 476aff., 144
– *Sophist*, 219e, 39
– *Symposium*, 211b1, 58
– *Theaetetus*, 174a4–b1, 130n3; 201e1, 149n48
– *Timaeus*, 73c1, 151
Pliny (the Elder), *Natural History*, 2.149 (= A11), 82–83
Plutarch
– *Convivial Questions*, 722a (= A74), 111
– *Life of Lysander* 12 (= A12), 83
– *Life of Nicias*, 23 (= A18), 85–86
– *Life of Pericles*, 4 (= A15), 84; 6 (= A16), 85; 16 (= A13), 83–84; 16 (= A32), 90; 32 (= A17), 85
– *Natural Questions*, 911d (= A116), 125
– *On Exile*, 17.607f (= A38), 92
– *On the Face in the Moon*, 929b (= B18), 26–27, 111; 937f, 111–12n33
– *On Fortune*, 98f (= B21b = A102), 122–23, 123n46
Proclus
– *Commentary on Euclid*, 65.21 (= A9), 82
– *Commentary on Plato's Timaeus*, 3.63, 36 (= A75), 111
Psellus
– *Miscellany*, 15 (= A101a), 122
– *On Stones*, 26 (= A98a), 121
Pseudo-Iamblichus
– *Arithmetical Theology*, 6.18 (= A20b), 86

Scholium on Apollonius of Rhodes, 1.498 (= A72), 110; 1.498 (= A77), 111
Scholium on Aratus's *Phenomena*, 545.20 (= A81), 113
Scholium on Aristides, Vatic. Gr. 1298 (= A66), 107
Scholium on Gregory of Nazianzus (= B10), 22–23, 53–54, 179n4
Scholia on Homer, *Iliad*, 16.161 (= A98), 121; 17.547 (= B19), 28–29
Scholium on *Prometheus Bound*, 88 (= A86a), 114–15
Seneca, *Natural Questions*, 2.12.3 (= A84), 114; 2.19 (= A84), 114; 4a2.17 (= A91), 114; 6.9.1 (= A89), 116–17; 7.5.3 (= A83), 113
Sextus Empiricus
– *Against the Mathematicians*, 7.90 (= B21), 28–29; 7.139, 231n69; 7.140 (= B21a), 28–29
– *Outlines of Pyrrhonism*, 1.33 (= A97), 121
Simplicius
– *Commentary on Aristotle, On the Heavens*, 119.2 (= A73), 110; 511.23 (= A88), 116; 520.28 (= A88), 116; 608.23 (= B7), 20–21, 33; 609.5–11, 212n20
– *Commentary on Aristotle's Physics*, 7.13, 149n48; 24.19 (= A8), 82; 27.2 (= A41), 93–94; 27.15–17, 216–17n34; 34.18–20 (= B4a), 16–17, 27; 34.20, 18nn4–5; 34.20–27 (= B4b), 18–19; 34.21–26, 47; 34.27–28, 42; 34.29–35.9, 212n20; 35.15 (= B9), 20–21; 44.1–10, 164; 154.29 (= A64), 107; 155.21, 26; 155.23ff. (= B1), 14–15; 155.23, 14, 15; 155.26, 33; 155.30 (= B2), 14–15; 156.4–9, 18nn4–5; 156.9 (= B5), 18–19; 156.13 (= B12), 22–25; 157.3–4, 65n61; 157.5 (= B14), 24–25; 157.9–16, 212n20; 157.12, 16n3; 157.17 (= B4a), 16–17; 163.18 (= B17), 26–27; 164.14–22 (= B3), 14–15; 164.22 (= B11), 22, 23; 164.24 (= B12), 22–25; 164.25 (= B6), 18–19; 165.14–15, 65n61; 166.15 (= A41), 94; 170.3, 26, 27; 172.18–19, 65n61; 174.20, 41; 175.11 (= B8), 20–21; 176.28, 20n7; 178.33ff., 165&n25; 178.33–79.12, 165n25; 179.3 (= B15), 26–27; 179.6 (= B16), 26–27; 300.27 (= B13), 24–25, 202, 207n3; 300.27–31, 169; 327.26 (= A47), 101; 460.4 (= A45), 99, 154n3; 460.16, 22; 460.18–20 (= A45), 173n45; 461.20 (= A53), 103; 1123.21 (= A45), 99; 1185.9 (= A59), 105
Sophocles, *Fragments*, 797, 118
Stobaeus, *Florilegium*, 4.52b.39 (= A34), 91
Strabo, *Geography*, 14 (= A7), 3, 81
Suda, A 1981 (= A3), 80

Tertullian, *Apology*, 46 (= A14), 84
Theophrastus
– *On the Causes of Plants*, 1.5.2 (= A117), 126, 152n55, 175–76n50; 3.1.4 (= A117), 126
– *On the Senses*, 1, 228n63; 27–29 (= A92), 119–20; 37 (= A92), 119–20; 59 (= A70), 109
Thucydides, *History of the Peloponnesian War*, 2.77.4, 98n23, 137n23

Valerius Maximus, *Memorable Doings and Sayings*, 8.7.6 (= A31), 90
Varro, *On Farming*, 1.40.1 (= A117), 126

Vitruvius, *On Architecture*, 7, Preface, 11 (= A39), 92–93

Xenophon
– *Hellenica*, 5.3.36, 39
– *Memoirs of Socrates*, 4.7.6 (= A73), 110
Xenophanes (DK21), B23, 195n7; B24, 195n7; B25, 195n7; B32, 74

INDEX NOMINUM

This index includes modern authors; for ancient authors see the General Index and the Index Locorum.

Baldry, H.C., 36n9, 172n42
Baltussen, H., 147n42, 192n1, 228n63
Barnes, J., 42n23, 47, 49n34, 50n35, 58n48, 59n50, 65n61, 71&n73, 75n81, 130n2, 134n17, 138n25, 141n31, 154–55n4, 158–59n12, 183–84n10, 191n28, 201n16, 235; on artefacts, 163n20; on existence and coming-to-be, 162–63, 162n18; on multiple worlds, 213n22; on *Nous*, 201n16; on particulate account of stuffs, 183–84n10; on primacy of metaphysics in Anaxagoras, 180n5; on regress argument, 190nn24–26
Beare, J.I., 228n63
Betegh, G., 143n35, 169n36, 195n6
Bicknell, P.J., 139n26
Bodnár, I., 154–55n4
Brennan, T., 76&nn85–86
Brisson, J., 151n54
Brumbaugh, R., 92n12
Brunschwig, J., 145n38
Burnet, J., 164n21, 213n22
Calder, W.M., 98n23, 137n23
Calogero, G., 44
Casson, L., 137n22
Cherniss, H., 5n6, 111–12n33, 147n42
Clark, G.H., 192n1
Cohen, M.R., 108n28
Connor, W.R., 240n4
Cornford, F.M., 39n15, 40n17, 147–48n44, 148n47, 179n4, 180n6, 190n24, 213n22; on austere ontology, 164n21, 165nn24–25
Curd, P., 33–34, 34n2, 133n15, 141n29, 163n19, 172n43, 176n51, 194n4, 231n69

Dancy, R., 144n36
DeFilippo, J.G., 194n4
Denyer, N., 234n71
De Strycker, E., 92n12
Drabkin, I.E., 108n28

Ferguson, J., 92n12
Fränkel, H., 42, 213n23, 215n28

Furley, D., 39n16, 47, 59n50, 134n17, 147n43, 148n45, 200n14, 202n18, 213n23, 215n29; on seeds, 171–72n40, 172n42, 176n52
Furth, M., 171n38, 172–73n44, 180n5; on artefacts, 158–59n12; on B17 as a mistake, 162n16; on expansive ontology, 154n3, 158–59n12; on large and small, 35n5, 184n11, 216–17n34; on Parmenides, 138n25

Gigon, O., 134n17, 213n22
Graham, D., 65n62, 74n66, 150n51, 158n11, 158–59n12, 179n3, 188–89n21, 211n15, 233n70; on austere ontology, 164n21, 165n24, 169n35; on expansive ontology, 154–55n4, 158–59n12; on principle of homoiomereity, 148n45
Guthrie, W.K.C., 39n13, 40n17, 44, 51n37, 67–68n67, 76n83, 89n11, 130n2, 134n17, 179n4, 180n6, 183n9, 200n14, 211nn17–18, 213n22, 216n34, 224n52; on B21b, 83n76; on clepsydra, 108n28; on expansive ontology, 154n3; on *leptos*, 59nn50–51; on orchestra, 92n12

Harris, W.V., 137n22
Hintz, E., 74n76, 223n70
Huffman, C., 36n8, 38&n12, 68n68

Inwood, B., 200n14; and austere ontology, 156n8, 164n21; on large and small, 35n5, 184n11, 186, 187n17, 216–17n34; on particulate account of stuffs, 183–84n10

Jaeger, W., 179n4
Janko, R., 143n35
Jöhrens, O., 39nn13, 15, 40n17, 76n82, 213n22
Jouanna, J., 48n33

Kahn, C., 163n19, 206n1, 213n22
Kember, O., 227nn58, 61
Kerferd, G.B., 65n62, 179n3, 183n9, 190nn25–26
Kirk, G., 126n47, 134n17, 211n15
Konstan, D., 183n9, 190n26
Kosman, A., 201n15, 203n17
Kouremenos, T., 143n35

Laks, A., 60n53, 62n58, 143n35, 192n1, 194nn3–4, 198n12
Lanza, D., 36n9, 39n13, 40n17, 44, 53n49, 59n50
Last, H., 108n28
Lebedev, A., 126n47
Ledbetter, G., 144n36
Leon, P., 214n24
Lesher, J.H., 60nn53–54, 62n58; on character of *Nous*, 194n4, 195nn5–6, 7, 195–96n8, 196n9, 197&nn10–11; on Xenophanes, 195n7
Lewis, E., 40–41, 40n19, 41, 42, 147n43, 150n51, 162nn16–17, 179n4, 180n6; on particulate structure, 181–82n8; on homunculus view of seeds, 172–73n44, 174n47
Lloyd, 171–72n40, 179n4
Louguet, C., 61n57, 66n64, 191n28, 194n4, 198n12, 201n17, 204n22, 213n21; on multiple worlds, 213nn22–23, 214n26, 215n28, 217&nn35–36, 220n42
Luria, S., 134n17

Mann, W., 147n43, 157–58n10, 174n47, 177n53, 183n9, 190n25
Mann, W.-R., 144n36

Mansfeld, J., 4n2, 53n41, 130n2, 135n19, 136n21, 210n12, 236n3; on Anaxagoras's chronology 131&nn5–7, 132n12, 132–33n13, 133n14; on doxographical tradition, 146n41, 235&n2, 242n5; on other worlds, 213n23, 214n24, 215&n28, 216–17&n34, 217, 219n40
Marcovich, M., 68–69n68
Mathewson, R., 165n24
Matthews, G.B., 190nn24, 26
McDiarmid, J.B., 147n42
McKirahan, R., 44, 68–69n68, 134n16, 213n22, 235
Menn, S., 55n44, 59n50, 66–67n66
Most, G., 143n35
Mourelatos, A.P.D., 43n24, 154–55n4, 163n19, 172n43, 172–73n44
Mueller, I., 4n2, 210n12

O'Brien, D., 131n5, 132–33n13, 133n14, 211n15
Osborne, C., 4n2, 210n12

Panchenko, D., 208–209n8
Parássoglou, G.M., 143n35
Peck, A.L., 158–59n12, 227n59
Pormann, P., 117–18nn36–43, 225n52
Powell, J.E., 44n26
Potts, R., 172n42

Raven, J.E., 39n13, 44, 134n17, 213n22
Reeve, D., 156n7
Robinson, T.M., 195n7
Rösler, W., 33, 132–33n13
Ross, W.D., 101n24, 105n26, 133n14, 205n23
Runia, D., 146n41, 235&n2, 236n3, 242n5
Schaubach, E., 39, 40, 44
Schenkeveld, D.M., 21n8
Schofield, M., 16n3, 18n5, 38, 41n20, 45, 58n47, 71nn72, 74, 131n7, 171–72n40, 178n1, 180n5; on Anaxagoras's book, 136–37, 137n22; on Anaxagoras and Zeno, 39n16, 134n17; on austere ontology, 150n51, 156nn8–9, 164nn21, 23, 165–66&nn25–26, 167&n30, 169n35; on B1, 33, 36n8; on B3, 39&n14, 40n17; on B10, 53–54, 53n40, 54n42, 164n23, 165n25; on B12, 24n9, 65n61; and intermediate ontology, 156n8, 166nn26, 28; on multiple worlds, 213nn22, 23, 214nn24–26, 215–16, 215nn29–31, 216–17, 216n33, 216–17n34, 218n38, 219n40; on *Nous*, 59n50, 60n54, 66n63, 218n38, 219n41; on nutrition and growth, 155n5, 156n8; on particulate interpretation, 49n34, 183–84n10; on *plēthos*, 34; on size and complexity, 40, 50n35, 215–16
Sedley, D., 37n11, 68n68, 169n36
Sider, D., 42n23, 48nn32–33, 74nn78, 80, 75n81, 130n2, 131n7, 134n17, 150n51, 183n9, 204n22, 217n25, 221n45; on B1, 36&n7; on B2, 37; on B3, 40–42; on B4a, 16n3, 44; on B4b, 18n5; on B10, 53n40; on B12, 24n9; on B13, 67–68n67; on B14, 68n68, 69n69; on B15, 26nn11,12, 70n71; on B18, 26n13, 74n77; on B19, 223n48; on 'B20,' 74&n80; on B21b, 76; on B22, 76nn84–85; on character of *Nous*, 59n50, 50–60n52, 60n55, 63n59, 64n60; on *plēthos*, 34n3
Silvestre, M.L., 194n3
Sinnige, T., 179n4, 183n9, 183–84n10, 190n26
Sisko, J., 190n26

Slings, S.R., 92n12
Smyth, H.W., 39
Solmsen, F., 28n14, 74&n78
Sorabji, R., 181–82n8, 183n9, 216–17n34
Stokes, M., 39n13, 71&n72, 165n25, 190n26
Strang, C., 39n16, 47, 50n35, 134n17, 162n16, 183n9, 183–84n10, 186n15, 191n28; C-substances, 190n26, 191n27; E-substances, 190n26, 191n27; on regress argument, 189–91, 190n24
Stratton, G.M., 228n63

Tannery, P., 156n8, 164n21
Taylor, A.E., 151n53
Taylor, C.C.W., 142–43n34, 231n69
Teloh, H., 144n36
Teodorsson, S.-T., 171–72n40, 176n51
Tigner, S.S., 70, 208n6, 209n9, 210n14, 211n18, 212&n19
Tsantsanoglou, K., 143n35

Verdenius, W.J., 36n8
Vlastos, G., 150n51, 156n8, 164n21, 165n25, 166n26, 168n31, 171–72n40, 179n4, 190n24, 213n23, 214&n27, 215n28
von Fritz, K., 195n6, 204n20

Wasserstein, A., 65n61
Waterfield, R., 65n61, 214n24
Woodbury, L., 130n2, 131nn4–7, 132n12, 135n19
Wright, M.R., 39&nn13–14, 54n43, 65n61, 71n74, 200n14

Zeller, E., 39, 40n17, 134n16, 183n9, 213n22

INDEX OF GREEK WORDS

This index lists words in Greek discussed in the notes and Essays. See also the General Index; a complete index of all the words in Anaxagoras' fragments can be found in David Sider, *The Fragments of Anaxagoras*.

ἄδηλος, 75
ἀλλοίωσις, 145
ἀλμυρός, 118
ἁλώδης, 118
ἀνυστός, 48
ἄπειρος, 35,
ἀποκρίνεσθαι, 10, 36, 37, 41, 43, 45, 48, 63, 66–67n67, 73, 75
ἀποκρινόμενα, 51
ἀφαυρότης, 75

βία, βίη, 52

γῆ, 70n71, 221
γίγνεται, 118
γονή, 54

διακρίνεσθαι, 10, 37, 43, 47, 48, 67, 73, 75
δοκεῖν, 42, 43

ἐκκρίνεσθαι, 40–41
ἐνεῖναι, 47
ἔργον, 44–45

ἡδονή, 44

κατασκευάζειν, 44–45

λαμπρός, 74
λεπτός, 59&n1
λόγος, 51
λύπη, 229

μέρος, 49
μηχανή, 101n24
μίξις, μέμεικται, 57–58
μοῖρα, 49, 54

νοῦς, 10–11
πίμπλημι, 34
πλῆθος, 34, 51
πόλος, 37–38
πολύς (Ionian, πολλός), 37–38

προσκρίνεσθαι, 69, 75

σπέρμα, 54
συγκρίνεσθαι, 10, 43
σύμμιξις, *συμμίσγεσθαι*, 37
συμπήγνυσθαι, 37, 44, 161

τομή, 134n16

φαινόμενα, 75

χρή, 42, 43n24
χρῆμα (*chrēma*), 33–34, 45, 57
χωρίς, *χωρισθῆναι*, 49, 50, 52